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Discussions of Metal Problems

Fall Meeting of the Institute of Metals Division in Detroit, Mich., October 2-6, 1933, in Conjunction with National Metal Week. Papers on Cutting Alloys, Expansion Alloys, Nickel, Zinc, Copper, Brass, and Investigations of Metal and Alloy Structure.

By H. M. ST. JOHN

Associate Editor

THE Metal Congress, an annual feature of the metallurgical world, sponsored by the American Society for Steel Treating, was held in Detroit during the week of October 2nd. In addition to a large and well attended exhibition by manufacturers of metals and equipment, there were many important technical sessions held by the five groups participating in the program, namely the Wire Association, the American Welding Society, the American Society for Steel Treating, the Iron and Steel Division of the American Institute of Mining and Metallurgical Engineers and the Institute of Metals Division of the same body.

The Institute of Metals Division held one joint session with the Iron and Steel Division and two independent sessions, one a formal technical meeting, one a Round Table on the use of non-ferrous metals in the automotive industry. The latter, conducted under the leadership of W. H. Graves and E. J. Hergenrother, was of unusual interest and importance, depicting up-to-date practice in the automotive field and indicating the trend which this practice is likely to follow. No formal preprinted papers were presented at this session but the principal points made by each speaker are summarized briefly on the following pages.

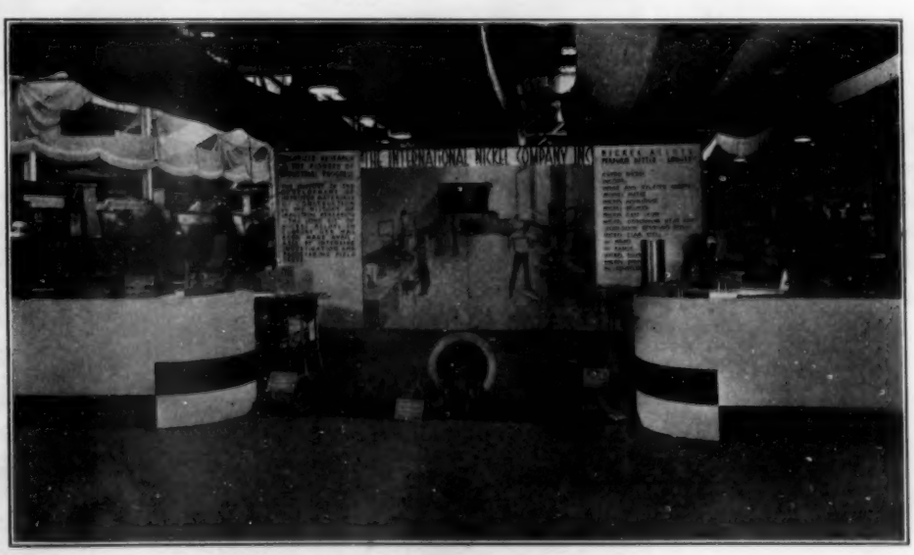


Exhibit of The International Nickel Company at the Metal Congress.

The Non-Ferrous Cutting Alloys

In the absence of Dr. Jeffries this subject was discussed by Mr. Robbins. The speaker stated that although the carbides of columbium, tantalum, titanium, molybdenum and boron have been suggested for use in cutting tools, tungsten carbide continues to be the basic material even in tools which consist in part of the other carbides. Some of these others have, however, assumed considerable importance.

Tools containing an appreciable proportion of tantalum carbide, while not so strong as those of straight tungsten carbide, are particularly well suited for machining steel. Titanium carbide is a good heat conductor, does not pick up metal from the work and is especially useful in the machining of high-speed steel. For use with the stainless steels, tools containing either tantalum or titanium are far superior to those made from tungsten carbide exclusively.

Tungsten carbide tools have been particularly successful in the machining of aluminum alloys, hard rubber and fiber. Although originally recommended particularly for high speed machining it has come to be realized that the principal advantage of such tools lies in the excellent finish which may be obtained by their use. In many cases they may be substituted for diamond pointed tools.

Expansion Alloys

R. G. Waltenberg of the H. A. Wilson Company described the many applications in the modern automobile of metals which are selected because of their high or low thermal expansion. The use of invar struts in aluminum pistons is a well known application of this character. Cast aluminum cylinder heads, used in conjunction with aluminum pistons, are being equipped with liners of an austenitic cast iron having the same thermal expansion as the aluminum.

Invar, a ferrous alloy containing 36 percent nickel, has the remarkable property of not suffering any appreciable expansion at ordinary operating temperatures. For this reason, it is almost invariably selected as one of the elements in what are known as bi-metal strips. These strips, made up in the form of springs, coils, helixes, etc., have as their other element a metal such as brass, or more commonly nickel-chromium steel, which has a considerable thermal expansion. When subjected to change of temperature the bi-metal elements change their shape or tension in such a way as to exert considerable force and are used in the control of automatic chokes, flow of cooling water, carburetor adjustment, gasoline gauges and shock absorbers.

Bearing Metals

This subject was discussed by E. R. Darby of the Federal Mogul Corporation, who pointed out that bearing materials and bearing design, ever since the beginnings of the motor car, have been dictated by the requirements of ever-increasing speed. At the present time, as usually in the past, engine bearings particularly are called upon to meet service conditions which are almost beyond their capacity. Bronze-backed bearings are being replaced by steel-backed bearings, still lined with babbitt but very thinly so. It seems probable that babbitt will soon be replaced by copper-lead mixtures or by an alloy such as that of nickel and cadmium which has recently been found to have favorable bearing properties.

In discussion from the floor there was some mention of the compressed copper-graphite mixtures which have found successful use in other bearing applications. It was also pointed out that the use of crank shafts having very hard smooth surfaces will result in substantially better bearing conditions.

Aluminum

E. H. Dix, Jr., of the Aluminum Company of America, described the increasing use of aluminum

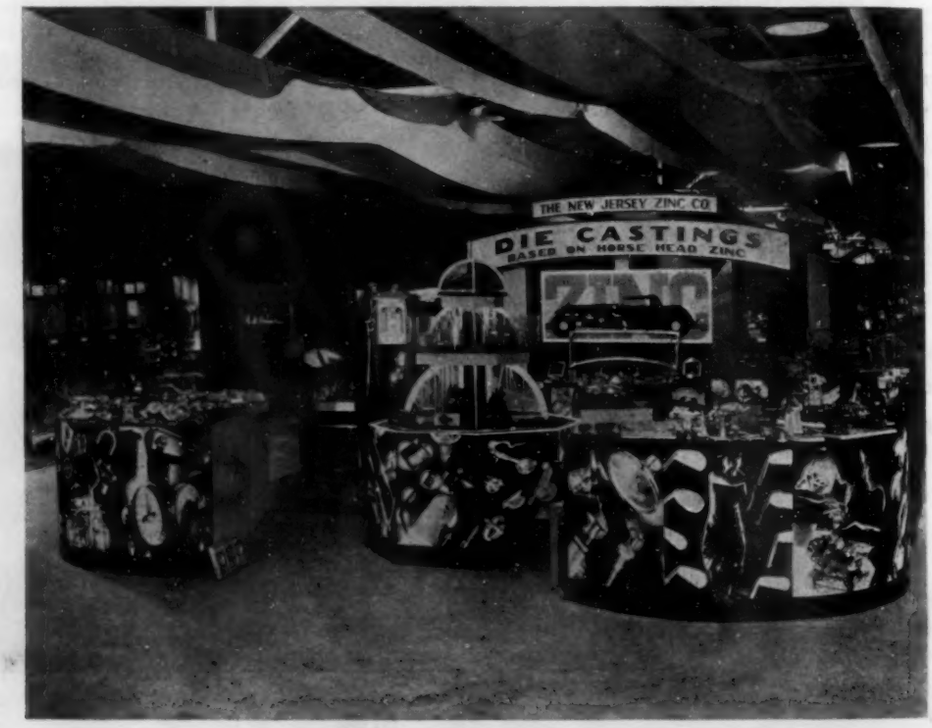


Exhibit of the New Jersey Zinc Company Which Won Honorable Mention. The Wide Variety of Uses for Zinc Die Castings Was Stressed.

and its alloys in the automotive field, the popularity of this metal depending upon its high thermal conductivity, light weight, pleasing color, ease of machining and resistance to corrosion.

In the truck field particularly, legal restrictions as to weight and higher weight taxes have made the use of light alloys very attractive. Savings in fuel costs, of great present importance in Europe, are likely to be influential toward increased use of aluminum in passenger cars, in this country as well. Aluminum alloy pistons and connecting rods have been of great help in meeting the demand for higher speed and improved acceleration. The recently adopted Lo-Ex alloy, with its lower thermal expansion and improved wearing properties, has been an important development.

Aluminum cylinder heads are noteworthy for high heat conductivity which, by preventing the formation of local hot spots, permits the use of higher compression with its attendant advantages.

Nickel

The various applications of nickel and its alloys in modern automotive design were enumerated by E. J. Hergenrother of the International Nickel Company. Everyone is familiar with the former extensive use of nickel plate as an exterior finish which in recent years has been largely replaced by chromium. However, a good chromium plate requires an underlying coating of nickel of about the same thickness as was formerly employed without the chromium. Other uses of nickel in the motor car include such items as nickel bronzes in the synchronizer cones, nickel as a plasticizer in the high-lead bearing bronzes, nickel alloy spark-plug wires and heat-resistance wires, nickel silver in hardware, monel carburetor needles, nickel cast iron for valve-seat rings, etc.

Zinc

According to W. M. Pierce, of the New Jersey Zinc Company, the average automobile contains 25 to 30 lbs. of zinc in various forms, some cars as high as 60 lbs. Rolled sheet zinc is extensively used for the fabrication of instrument panels, dials, ash trays, dome-light rims inside the car, as well as for running-board mouldings, window frames and the like, outside parts which are exposed to the weather. Its white color and resistance to corrosion, as well as the ease with which it may be formed and plated are much in its favor.

In the case of zinc die castings for hardware, radiator fronts, cowl bars and many other parts the savings in fabrication costs are of materially more importance than the saving in cost of materials, although the latter is by no means negligible. In one car the adoption of a zinc radiator front resulted in an initial saving of $8,000 in the cost of tooling, and of $1 per car in the cost of production; the use of a zinc cowl bar saved $13 per car.

Copper and Brass

W. G. Schneider, of the Copper and Brass Research Association, deprecated the extensive and increasing use of cheaper materials in motor-car manufacture, a tendency which he stated would result in shorter car life, less satisfactory service and customer dissatisfaction.

The average medium-price car contains about 45 lbs. of copper, itemized as follows: 10 lbs. in the electrical equipment, 20 lbs. in the cooling system, 5 lbs. in miscellaneous plated parts, 5 lbs. in hardware and screws, 5 lbs in the bearings.

Mr. Schneider expressed the belief that bronze-backed bearings are preferable to those made of steel since they have a higher heat conductivity and will not score the shaft if the babbitt fails. Compressed copper-alloy bearing metal to replace babbitt is a promising development. Copper-lead mixtures are also used for clutch facings.

Plastic Deformation and Tensile Properties

A paper entitled "The Relation Between the Plastic Deformation in Deep Drawing and the Tensile Properties of Various Materials" by M. H. Sommer was presented by A. B. Kinzel. The paper was not preprinted but its presentation was illustrated by a number of slides showing by means of curves, the theoretical limits, in capacity to withstand drawing without fracture, which may be expected from a variety of materials, including copper, brass, aluminum and certain of the ferrous metals. These curves were calculated by Dr. Sommer from stress-strain diagrams, using a purely empirical method. The results seemed to be in satisfactory agreement with the corresponding Erichsen values but in discussion it was fairly well agreed among those present that Erichsen readings are not dependable unless they are taken under precisely identical conditions. It was stated that different laboratories are unable to obtain results which check with one another because of differences between machines, operators, shape of samples and the surface condition of the metal under test. Measuring the load required to operate the machine was one suggestion for improving the accuracy of the test; the rate of loading was also mentioned as a factor of considerable importance, particularly in the case of zinc sheet for which the rate of load application must be very slow.

Weight and Atomic Percentages

A paper on "The Interconversion of Atomic, Weight and Volume Percentages in Binary and Ternary Systems," by Cyril S. Smith, dealt with the mathematics of making such conversions, with fair accuracy, by means of tables.

Cadmium-Nickel System

Carl E. Swartz and Albert J Phillips presented a brief paper, "Notes on the Cadmium-Nickel System," which described a scientific attempt to develop a successful bearing alloy. Results were promising but not yet conclusive. A typical bearing-metal structure was obtained with a eutectic containing 0.25 percent nickel, melting at 318°C (604.4°F). In discussion it was suggested that a cadmium-nickel alloy might be a more satisfactory solder for aluminum than the zinc-cadmium alloys now commonly used.

Copper Embrittlement

A paper entitled "Copper Embrittlement" was given by L. L. Wyman. This paper is the third in a series; previous papers have dealt with the behavior of various pure and deoxidized coppers when exposed to an oxidation-reduction cycle. This paper is concerned with the penetration of embrittlement as the time of exposure is varied, and with the variations of oxygen penetration under varying conditions of time and temperature. It was found that the elimination of oxygen from the copper made it more resistant to the

embrittling action of hydrogen. No embrittlement was encountered at temperatures up to 400°C (752°F) with copper containing up to 0.06 percent oxygen. The rate of penetration by oxygen into pure copper decreases greatly below 800°C (1472°F) and the rate of penetration by hydrogen into copper containing oxygen decreases greatly below 700°C (1292°F). Below these temperatures copper containing no oxygen is distinctly more resistant to embrittlement by recurring exposure to oxidation and reduction.

Copper-Cuprous Oxide Eutectic

A paper on "Structure and Origin of the Copper-cuprous Oxide Eutectic," by L. W. Eastwood, brought out a good deal of discussion. It is a study of the arrangement of the cuprous oxide grains with respect to the axes of the copper crystals in the eutectic. Dr. Mehl stated that our whole theory of eutectic formation needs to be revised. It appears from the result of this and other investigations that the constituents of the eutectic are deposited simultaneously rather than alternately and that the orientation of the eutectic particles is predetermined by the orientation of the pure metal crystals upon which the particles are deposited.

Special Lectures

As one of the features of the meeting a joint dinner was held by the two divisions of the A. I. M. E., at which A. B. Kinzel of the Union Carbide and Carbon Research Laboratories gave an interesting talk on silicon. Of interest also to non-ferrous metallurgists was the Campbell Memorial lecture by H. J. French of the International Nickel Company on the subject: "Fatigue and the Hardening of Metals."

Flux for Phosphor Tin

Q.—Please advise if you know of any material used as a flux for phosphor tin that will make it flow more freely.

A.—We would suggest refining your metal by using a green piece of wood or a raw potato and inserting it in the metal by pushing it to the bottom of the metal container with a pair of tongs. This will cause the metal to boil and expel the oxides and clean the metal so that it will run freely. Flux with powdered rosin and sal-ammoniac, 50-50.

If you are using this metal in connection with other metals, such as tinning some articles, you may be taking up other metals. In that case, after refining the metal let it stand in the melting pot and cover with litharge for 30 to 45 minutes; then remove the covering. You will find this has a tendency to gather the foreign metals that your phosphor tin may have taken up. The addition of 1% bismuth will also increase the fluidity of the metal.—W. J. Reardon.

Norway Iron for Brass

Q.—Will you kindly advise as to the source or sources of supply of Norway iron tacks, which I have seen mentioned many times as the best medium for introducing iron into manganese bronze.

A.—Norway iron is a very pure iron used for making tacks. Horseshoe nails are mostly made from this material, and the scrap is very often used for introducing iron into brass on account of its purity.

The source of supply is from the manufacturer of tacks and horseshoe nails. The pure Norway iron can be bought in bars at any of the dealers of steel and iron shapes.

We believe you can obtain material suitable from any manufacturer of horseshoe nails, and the general opinion is that it is just as good as imported scrap. The analysis should run, approximately, carbon .03, manganese .31, phosphorous .045, silicon trace, sulphur .037.—W. J. Reardon.

Properties and Testing of Foundry Sands

AN ABSTRACT OF LETTER CIRCULAR LC 363 OF THE BUREAU OF STANDARDS

ONLY very general recommendations can be given to cover the choice of sands for specific uses. The information given in Table 1, which is based largely upon experience, is intended as suggestive rather than in the nature of a categorical reply to the question often asked of this bureau as to the proper sand for a certain specific use.

TABLE 1—SANDS FOR SPECIFIC USES

Material	Casting Rel. Size	A. F. A. Sand Class	Compressive Strength lbs/sq. in.	Permeability Number
Brass	light	1; D or E	3-4.5	8-12
Brass	medium	2; E	3-5	10-17
Aluminum	light	3; E	3.5-6	17-25
Al. alloys	medium	1; E, F or G	3-7	8-15
Al. alloys	heavy	1 or 2; E or F	4-8	10-20
Cast iron	light	2, 3, or 4; E	3-8	15-65
Cast iron	medium	4 or 5; E	4-9	65-100
Cast iron	heavy	5, 6 or 7; E or F	6-10	75-150
Malleable iron	light	3; E or F	3-8	20-50
"	medium	4; E	4-9	50-100
	heavy	5, 6 or 7; E	6-10	90-125
Steel	light	5; C	4-8	100-150
Steel	medium	5 or 6; C	4-8	125-200
Steel	heavy	6 or 7; C	4-8	150-250

For convenience in reference most of the data on molding sands given in the course of the discussion in this paper has been collected in Table 2, next page.

Table 2—Results of Tests on Various Commercial Molding Sands

No.	State of origin	Designation of sand (1)	Results of sieve analysis, per cent retained on sieve: b	12	20	30	40	50	70	100	140	200	270	Pan	Clay	Physical properties: Moisture	Permeability	Compressive Strength	Sintering point	Grade: Grain fineness number	Grain class	Clay class	Grain shape	Use in casting: Material	Relative size
																Per cent		lbs/sq.in.	°C						
1	N. Y.	Albany,00	0.0	0.1	0.2	0.3	0.4	0.8	1.6	7.0	16.2	17.3	12.8	30.8	12.4	3.5 5.2 7.2	14.7 14.5 14.3	6.0 5.4 4.8	1,200	188	2	E	Sub-angular	Cast iron, brass or aluminum	Light
2	Ohio	Zanesville	--	--	.2	.1	.3	2.0	6.9	10.0	8.8	8.7	7.7	18.9	15.8	4.1 5.1 7.8	7.7 9.8 10.8	4.3 4.3 4.1	1,200	196	2	F	Compound	do	do
3	N. J.	Pettinos	--	--	--	--	2.0	3.0	23.6	28.6	18.0	6.0	0.8	3.0	15.0	2.8 4.3 6.5	72 93 87	6.2 8.8 6.2	1,225	83	4	F	Sub-angular	do	Heavy
4	do	Downer	--	--	.5	1.6	6.4	12.3	18.1	34.2	11.5	1.5	.5	1.6	11.6	3.3 5.3 7.4	102 88 77	10.2 4.9 3.0	1,250	67.5	5	E	do	Cast iron and steel	do
5	do	Lumberton	--	.3	2.0	3.0	4.1	7.7	10.3	14.5	14.8	7.7	3.1	12.2	20.0	3.6 5.8 7.2	19 38 29	6.7 6.8 6.4	1,200	111.4	3	G	do	Brass, cast iron	do
6	Ohio	Red gravel	11.6	6.1	13.7	15.1	14.2	7.8	3.2	2.0	1.3	0.8	0.5	3.0	19.8	3.6 4.9 7.5	235 80 440	too dry 6.4 7.0	1,300	35.1	7	F	do	Molding	do
7	Va.	Campbell's core sand	--	0.3	1.6	4.5	15.6	39.9	24.2	7.0	1.8	.6	.3	1.0	3.2	Dry	287	--	1,400	46	6	C	do	Cores	---
8	Foreign	French	--	--	0.1	0.1	0.1	0.9	1.4	3.7	7.4	19.6	25.3	21.8	19.2	4.1 6.2 7.4	25 23 30	13.2 4.6 9.0	1,175	192	2	F	do	Statuary bronze, etc.	---
9	N. J.	Downer open hearth and core sand	--	--	.6	1.6	5.4	14.3	21.9	30.6	17.5	3.0	0.5	0.3	3.6	3.4 5.1 7.2	156 146 138	1.6 1.6 2.0	1,325	67	5	C	do	Steel	---
10	Ohio	Rush run	--	.2	.3	0.1	1.0	14.6	20.4	10.4	7.5	4.8	3.2	12.9	24.8	3.7 5.3 6.9	61 50 46	8.2 14.2 10.4	1,225	110	3	G	Angular	Iron	---
11	N. Y.	Albany,00	--	--	--	--	0.3	0.3	0.5	1.0	5.8	8.7	10.8	55.2	17.3	4.7 6.2 7.8	13.4 14 14	6.3 5.7 4.7	1,175	249	1	F	Sub-angular	Brass and aluminum	-----
12	Ill.	Ottawa core sand	--	--	--	5.	18.	25.	30.	14.	6.	2.	--	--	--	Dry	95	--	--	50	5	-	Angular	Cores	---
13	do	Ottawa steel-mold sand	--	--	--	--	--	--	90.	--	--	--	--	--	10.	1.7	65	8.8	1,250	50	5	E	Round	Steel	---
14	Mich.	Buchanan	--	--	.3	0.1	0.1	0.4	3.4	11.7	15.9	11.3	7.3	41.8	7.7	3.5 5.0 6.7	6.7 9.0 8.5	3.3 3.5 4.1	1,225	197	2	D	Compound	Cast iron, brass or aluminum	Light
15	Ala.	Tuscaloosa	--	1.0	.6	.6	.6	1.8	6.0	9.8	13.8	11.6	9.3	22.0	22.8	8.0	20.	3.2	--	162	2	G	--	Brass and cast iron	do
16	Miss.	Red molding	--	--	--	--	2.0	17.1	30.0	22.5	8.3	1.8	0.4	0.6	17.1	7.0	88	12.2	--	62	5	F	--	Steel	---
17	Tenn.	Molding	--	--	--	--	0.8	1.7	4.6	12.1	18.5	25.5	5.9	8.3	23.2	10.0	19.3	11.7	--	132	3	G	--	Brass and iron	Heavy
18	N. J.	South Jersey	--	0.2	.4	.6	1.9	7.3	17.7	27.1	14.5	4.4	3.1	6.2	16.6	7.5	40	9.0	--	92	4	F	--	Steel	---
19	Md.	Campbell	--	--	.3	.5	1.5	8.6	20.0	13.6	8.7	9.5	1.8	11.2	24.5	4.3 6.1 8.3	10.3 24.7 24.5	12.0 12.5 11.9	1,200	109	3	G	Sub-angular	Iron	---
20	do	Mariboro	2.6	.6	.9	1.0	1.4	2.0	5.2	6.1	7.4	38.7	9.0	19.4	5.7	3.9 5.8 8.1	26.9 31.0 29.0	2.7 2.8 3.5	1,250	155	2	D	do	Cast iron, brass or aluminum	Light
21	D. C.	Georgetown	--	--	--	--	--	0.2	0.4	3.4	7.1	22.4	15.4	27.3	23.7	3.1 5.3 7.2	4.4 7.6 11.6	7.7 11.0 13.7	---	201	1	G	do	Brass or aluminum	---

(1) All are molding sands unless otherwise designated.

The Metal Manufacturing and Finishing Industries of the United States

By ADOLPH BREGMAN
Managing Editor

What It Is; Who Buys Its Output; Who Supplies It With Equipment and Supplies. A Survey of the Available Statistics of the American Industries Manufacturing Non-Ferrous Metal Products and Finishing All Metals; Also the Trades Which Consume These Products, and the Trades Furnishing Its Needs.—Part 4, Conclusion*

BELOW will be found tabulations for some manufactured articles such as Lighting Equipment, Needles, Pins, Hooks and Eyes and Snap Fasteners. These products (except for needles) are made almost entirely of non-ferrous metals, brass, die casting alloys, slush metal, etc.

Lighting Equipment

	Number of Establishments	Quantity	Value
Aggregate	(1)		$147,742,447
Electric lighting equipment:			
Residence, total	4385		51,256,780
Ceiling or chandelier type (except kitchen units)	200		16,611,810
Wall or bracket type (except kitchen units)	162		7,094,845
Kitchen units	74		1,539,841
Portable lamps—			
Table and boudoir	135		9,385,005
Bridge and floor	141		10,402,565
Candelabra, candlestick, electric candle	35		739,886
Lanterns and other outdoor-fixtures	84		1,763,093
Other	50		3,719,735
Commercial, total	4141		15,300,476
Auditorium, church, and theater	99		5,878,962
Public buildings, bank, store, office building, school, etc.	93		7,938,256
Window and show case	31		1,108,520
Photographing, photo-engraving, and blue printing	5		374,738
Industrial, total	431		2,147,984
Factory	19		1,630,983
Office and drafting room	21		517,001
Miscellaneous lighting equipment, total	4147		52,579,195
Street and highway fixtures	10		3,287,588
Desk and reading lamps	22		1,077,356
Motor-vehicle lamps complete	44		36,384,191
Other electric fixtures, including arc lamps (not therapeutic), motorcycle, and miners' lamps	89		11,830,060
Lighting equipment not reported as to kind by manufacturer	58		4,920,711
Kerosene and gasoline lighting equipment, total	423		5,676,259
Lamps	14		2,084,257
Lanterns	13		3,592,002
Reflectors and shades, total	443		4,960,813
Metal, all types	29		3,683,071
All glass and all porcelain	15		1,277,742
Incandescent mantles	7		1,595,978
Carbide lamps (miners', bicycle, motorcycle, etc.)	8		751,504
Other lighting fixtures and equipment, including gas fixtures, and posts and standards	53		3,785,530
Parts	42		4,767,217

Needles, Pins, Hooks and Eyes, and Snap Fasteners

Aggregate	(1)		$20,425,697
Needles, total	421		6,488,869
Knitting-machine (latch and spring)	(2)		4,828,865
		Thousands	
Other needles, including sewing-machine	(2)	128,554	1,660,004
Pins, total	418		6,263,563
Common or toilet, made of steel and brass wire, total	49		1,709,162
Reported in pounds	...	2,015,152	1,221,101
Reported in packs	...	1,187,231	488,061
		Pounds	
Hairpins, metal[7]	8	4,799,175	2,335,504
		Gross	
Safety pins	6	8,008,813	2,218,897
		Great gross	
Hooks and eyes	3	181,656	200,467
Eyelets	7	433,035	784,043
		Yards	
Hook-and-eye tape	4	14,276,203	1,156,055
Snap fasteners and clasps	14		5,532,700

Nonferrous Metal Alloys and Products[8]

In this class classification are all plants producing fabricated and "semi-manufactured" non-ferrous metals. Here the figures must be carefully analyzed. Brass foundries (Castings, Rough), for example, are listed at 718 in number. There are many more, of course, probably between 1500 and 2000, but they are included among manufacturers of various items such as bushings, etc.

Plates and sheets, aggregate	465		[9]$193,945,176
		Short tons	
Brass and bronze, total	31	255,255	.....
For sale	...	215,575	91,024,037
Transferred to other plants of same company	...	18,646	.....
Assigned value	...	.....	7,521,019

* Parts 1, 2 and 3 were published in our January, February and May issues.

[1] All footnotes are at the end of this instalment.—Ed.

	Number of Establishments	Quantity	Value
Produced and consumed in same works	...	21,034	.....
Copper, total	25	129,223	.....
For sale and interplant transfer	...	127,789	59,539,928
Produced and consumed in same works	...	1,434	.....
Lead, for sale and interplant transfer	12	35,802	6,490,493
Zinc, for sale and interplant transfer	8	54,135	9,543,739
Nickel alloys, for sale and interplant transfer	17	27,162	18,337,961
Other metals, for sale and interplant transfer	9	2,419	1,487,999
Rods, total	[4]48	.....	[8]135,852,141
Brass and bronze total	19	170,228	.....
For sale and interplant transfer	...	125,243	45,869,031
Produced and consumed in same works	...	44,985	.....
Copper, total	16	569,540	.....
For sale and interplant transfer	...	227,308	81,057,185
Produced and consumed in same works	...	342,232	.....
Nickel alloys, total	12	8,064	.....
For sale	...	7,232	5,875,561
Produced and consumed in same works	...	832	.....
Other nonferrous metals for sale	6	3,628	3,050,364
Tubing (seamless) and pipe, total	[4]65	.....	[8]73,888,613
Brass and bronze, total	24	71,599	.....
For sale	...	68,650	35,106,937
Transferred to other plants of same company	...	2,636	.....
Assigned value	...	.....	1,122,784
Produced and consumed in same works	...	313	.....
Copper, for sale and interplant transfer	24	49,062	25,774,350
Lead, for sale and interplant transfer	29	37,026	7,000,576
Nickel alloys, for sale and interplant transfer	12	1,789	2,541,819
Other nonferrous metals, for sale and interplant transfer	12	3,686	2,342,147
Other tubing, including brazed	6	.....	4,013,360
Castings, rough, total	[4]718	.....	115,586,925
		Pounds	
Brass and bronze	666	413,512,944	98,903,131
Copper	85	9,798,512	2,690,725
Nickel alloys	43	5,227,046	2,942,165
Other metals[9]	365	28,006,556	11,050,904
Finished products:[10]			
Extruded shapes, total	[4]21	.....	6,665,268
Brass and bronze	8	.....	5,245,183
Other nonferrous metals, including copper	16	.....	1,420,085
Bearings and bushings (including antifriction linings), total	[4]118	.....	27,680,058
Brass and bronze	111	.....	26,599,654
Other nonferrous metals	15	.....	1,080,404
Bells	14	.....	809,245
Die castings	41	.....	22,076,623
Finished castings, total	[4]158	.....	15,550,907
Brass and bronze	134	.....	12,352,183
Other nonferrous metals	51	.....	3,198,724
Forgings and hot-pressed parts, total	[4]14	.....	7,768,582
Brass and bronze	13	.....	7,651,635
Copper	3	.....	89,692
Other nonferrous metals	5	.....	27,255
Other nonferrous metal products	183	.....	42,020,428
Miscellaneous nonferrous metal products normally classified in other industries	...	.....	208,321,547
Plated Ware			
Aggregate	(1)	.....	$52,502,851
Electro silver-plated ware, total	[4]85	.....	44,623,305
Flatware, including cutlery, total[11]	[4]26	.....	29,772,127
Hotel patterns	11	.....	2,679,941
Commercial patterns	21	.....	27,092,186
Hollow ware (except electrical household appliances), total	[4]54	.....	11,644,390
Hotel services	13	.....	2,522,418
Commercial lines	47	.....	9,121,972
Toilet ware and novelties	18	.....	1,286,942
Other articles	20	.....	1,919,846
Nickel-silver ware (nickel base not plated with silver), total	[4]22	.....	4,941,305
Flatware (including cutlery)	11	.....	2,878,49[illegible]
Hollow ware (except electrical household appliances)	6	.....	1,239,979
Toilet ware and novelties	7	.....	355,206
Other articles	5	.....	467,623
Pewter ware, total	[4]38	.....	2,938,241
Hollow ware	35	.....	2,642,202
Novelties	6	.....	296,039
Silversmithing and Silverware			
Aggregate	(1)	.....	$26,167,556
Flatware (including cutlery)	26	.....	11,254,910
Hollow ware, except electrical household appliances	62	.....	10,432,147
Novelties, except electrical household appliances	13	.....	1,241,315
Toilet ware	14	.....	1,749,957
Other sterling silver articles	19	.....	1,489,227
Smelting and Refining, Metals Other Than Gold, Silver, or Platinum, Not From the Ore[3,12]			
Products for remanufacture:			
Ingots and pigs, aggregate	(1)	.....	$169,447,667
Copper (secondary), total	28	.....	16,512,500
		Short tons	
"Smelting and refining, not from the ore" industry	19	44,215	14,648,156
"Nonferrous-metal alloys and products" industry	9	5,907	1,864,344
Lead (secondary), total	[4]102	.....	21,538,673
"Smelting and refining, not from the ore" industry—			
Common	42	27,425	4,063,829
Antimonial	23	78,286	10,945,001
"Nonferrous-metal alloys and products" industry—			
Common	51	29,634	4,042,627
Antimonial	21	17,697	2,487,216
Zinc (secondary), total	39	.....	5,519,127
"Smelting and refining, not from the ore" industry	25	38,184	5,322,352
"Nonferrous-metal alloys and products" industry	14	1,659	196,775
Tin (secondary), total	45	.....	2,664,760
"Smelting and refining, not from the ore" industry	23	1,361	1,167,248
"Nonferrous-metal alloys and products" industry	22	1,795	1,497,512
Brass and bronze, total	54	.....	43,568,172
"Smelting and refining, not from the ore" industry	42	112,259	33,427,374
"Nonferrous-metal alloys and products" industry	12	33,231	10,140,798
Antifriction bearing metal, total	103	.....	20,301,315
"Smelting and refining, not from the ore" industry	32	11,611	4,212,937
"Nonferrous-metal alloys and products" industry	71	42,758	16,088,378
Solders, total	110	.....	28,595,090

	Number of Establishments	Quantity	Value
"Smelting and refining, not from the ore" industry...	37	15,935	7,267,091
"Nonferrous-metal alloys and products" industry...	73	40,488	21,327,999
Type metal, total.....	67	.....	7,885,354
"Smelting and refining, not from the ore" industry...	25	11,845	2,367,318
"Nonferrous-metal alloys and products" industry...	42	30,445	5,518,036
Other nonferrous metals, total [10]	66	.....	22,862,676
"Smelting and refining, not from the ore" industry...	31	.....	14,969,692
"Nonferrous-metal alloys and products" industry...	35	.....	7,892,984
Stamped Ware, Enameled Ware, and Metal Stamping, Enameling, Japanning, and Lacquering			
Aggregate	(1)	.....	$213,666,794
Stamped household ware (other than vitreous enamel and aluminum), total	[4] 100	.....	33,213,148
Galvanized-iron ware	35	.....	8,585,481
Tinware	31	.....	11,743,969
Japanned, lacquered, and paint-enameled ware	29	.....	4,421,370
Other metal ware	60	.....	8,462,328
Stamped automotive parts and accessories	108	.....	56,985,027
Other stamped ware.....	380	.....	55,838,399
Enameled ware (vitreous), total..	[4] 92	.....	35,017,903
Kitchen and other household ware	40	.....	23,500,948
Hospital ware	12	.....	657,448
Other enameled ware.....	60	.....	10,859,507
Perforated metals	25	.....	4,300,194
Bottle caps	35	.....	28,312,123
Tin and Other Foils, Not Including Gold Foil			
		Pounds	
Aggregate	(1)	96,188,082	$21,862,284
Aluminum foil	5	9,921,671	6,009,601
Tin, lead, and composition foil [5]...	6	86,266,411	15,852,683

Footnotes

[1] The aggregate numbers of establishments—i. e., the sums of the several items for a given group of products—are not shown because such aggregates would greatly overstate the actual numbers of establishments reporting the groups of products in question. This condition arises because in practically all cases each establishment is engaged in the manufacture of more than 1 of the individual products or classes of products. The net numbers of establishments reporting the several groups of products are not shown by the census tabulations.

[2] The net number of establishments reporting the several products are not shown by the census tabulations.

[3] The amounts under this heading represent products manufactured during the period covered, whether sold or not.

[4] Inasmuch as some establishments manufacture more than 1 kind of product, the totals in this column are smaller than the sum of the figures below them.

[5] Combined in order to avoid disclosing data for individual establishments.

[6] Includes value of other products made in industry, but does not include value of fire extinguishers made as secondary products in other industries. The actual value of fire extinguishers manufactured in all industries reporting them as either major or minor products, $7,544,119.

[7] Statistics on the production of hairpins other than metal are given in the report on "Combs and hairpins, not made of metal or rubber."

[8] This figure does not include value of quantities reported as produced and consumed in same works.

[9] Includes aluminum castings which are shown as a total in the "Aluminum manufactures" industry.

[10] Data on quantity not called for.

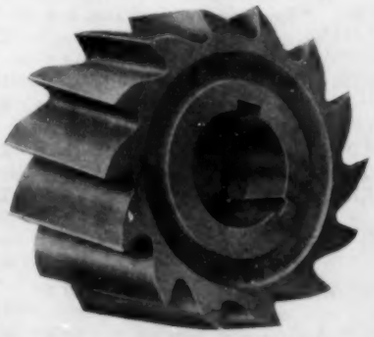
[11] Statistics on the production of cutlery, other than plated, will be found in the reports for "Cutlery and edge tools" and "Silver-

[12] This table presents statistics for the total production of ingots and pigs in both the "Smelting and refining, metals other than gold, silver, or platinum, not from the ore," and "Nonferrous metals and alloys" industries; also for the production of these fied in other industries, valued at $3,237,506.

[13] Includes aluminum ingots which are reported in the total production of ingots in the "Aluminum manufacturers" industry.

Milling Tools for Aluminum

The general requirements of milling cutters for machining aluminum, as compared with those for steel, are that they have greater clearance, or relief, more shear and front rake, or undercut, together with wider grooves to prevent the chips from packing or balling. Smooth



Milling Cutter for Aluminum

curves of large radius and no sharp corners cause the chips to flow freely away from the work and tool. This means that the cutters must be coarse-toothed. The cutting speeds may be several times greater than for iron and steel. The cuts on small sections may be dry; for heavy sections a flood lubrication (using kerosene with 10 per cent of mineral oil) has been used, though the soluble lubricants are suitable.

A typical milling cutter for aluminum is shown in the illustration. This modern milling cutter for steel is excellent for aluminum, more so in fact than is any other class of tools previously mentioned. The clearance is greater, or 8 degrees instead of 4 degrees; the teeth are undercut, or hooked, from 10 degrees to 20 degrees; and the helix may be 25 degrees.—W. B. Francis.

Test Paper for Nickel Plate

Q.—We understand that there is a testing paper which indicates the presence of iron in a nickel deposit.

A.—Karl Pitschner wrote an article describing the use of a special treated paper to detect the porosity of nickel on electroplated iron or steel. It will also indicate places where the nickel deposit is cut through by buffing. This article was read at the meeting of American Society for Testing Materials in 1927. It was also published in the **Metal Industry,** Vol. 25, 1927, p. 336. The testing paper is on the market.—G. B. H.

Tests of Thickness of Protective Cadmium Coatings on Steel

By S. G. CLARKE

Abstract of paper presented before the Electrodepositors' Technical Society at the Northampton Polytechnic Institute, Clerkenwell, London, E. C. 1, on Wednesday, May 17th, 1933. Abstract by Dr. A. K. GRAHAM, Associate Editor, Metal Industry.

Introduction

THE chief factor which determines the degree of protection afforded to steel by electrodeposited cadmium would appear to be the thickness of the coating, since under normal conditions of outdoor atmospheric exposure, for example, the cadmium is slowly removed by corrosion effects. In order to secure adequate protection, therefore, the coating must be of sufficient thickness to endure for the requisite length of time under the particluar conditions encountered in its service life. Furthermore, different areas of an article may receive different thicknesses of deposit, owing to unequal distribution during plating. The inspection of cadmium coatings necessitates, therefore, the accurate determination of the thickness of the coating, and while it may be sufficient in some cases merely to determine the average thickness, it may be desirable in others to determine the regularity of thickness also.

The available information on thickness tests for cadmium coatings appears to be confined to methods based on the use of the antimony chloride-hydrochloric acid stripping solution, as described in a pamphlet issued by the Grasselli Chemical Company, New York. In the course of this investigation, the validity of these methods has been examined, and the use of a new stripping reagent, viz., a dilute ammoniacal solution of ammonium persulphate, has been studied. It will be noted that, as far as these methods are of value, they are not readily applicable to the testing of a selected area of the coating. Advantages in this respect are offered by a rapid method of testing which has been developed, and which involves the local dissolution of the coating by the action of drops of an iodine solution.

Notes on Choice of Method for the Determination of Thickness of Coating

The relative value of the methods to be described varies according to the kind of article to be tested. With large articles, the stripping processes, involving loss of weight determination, are cumbersome, owing to the large volume of solution required for the immersion and the difficulties in determining small differences in weight of large masses. The iodine dropping method would therefore appear to be more suitable, particularly as with the correspondingly large surfaces involved, it may be desirable to examine the regularity of thickness, for which purpose this method is specially adapted. Conversely, with decrease in size and surface area of the articles, the stripping methods become more appropriate. For small articles, such as rivets, bolts and pieces of wire, the surface area of which can be computed with sufficient accuracy, stripping provides a fairly rapid method of determining the thickness of coating. It is a matter for individual choice whether the ammoniacal ammonium persulphate or the antimony chloride-hydrochloric acid solution is used for the purpose of stripping, the former is less objectionable in use, and the latter is more rapid in its action. The degree of attack on the steel base by the antimony-hydrochloric acid solution, although negligible for practical purposes, is appreciable compared with the effect of the ammoniacal ammonium persulphate solution. With small, irregularly-shaped articles, the loss of weight method becomes uncertain, owing to difficulties in determining the surface area, and thus, in the absence of a more precise method, the "time of gassing" method becomes of value.

Iodine Dropping Method

This method, which has been developed in the course of this work, consists in allowing a standard iodine solution to drop at a defined rate on the surface to be tested, the thickness of cadmium being obtained from the number of drops required to perforate the coating.

Solution required.—10 per cent. iodine in 20 per cent. potassium iodide solution. This may be prepared as follows: 25 grams of iodine, accurately weighed in a weighing bottle, are added to a solution of 50 grams of potassium iodide in about 100 cc. of water. The liquid is well stirred to dissolve the iodine, diluted to 250 cc. and filtered through a mass of glass wool, well pressed into a funnel, or alternatively, through a sintered glass funnel.

Apparatus.—The apparatus consists of a separatory funnel of about 250 cc. capacity, having the stem cut off just below the tap (stop cock) A to a length of approximately 1 inch, with burette tap (stop cock) B connected to the stem by rubber tubing. The size of the orifice of the burette jet is not critical, but a small orifice is desirable for economy of the iodine solution.

Cleaning and Filling Apparatus.—The glass parts are well cleaned, particular attention being paid to removing all pre-existing grease or foreign matter from the bore of the taps. The apparatus is dried, and the minimum quantity of vaseline, to permit of easy working of the taps, is applied, care being taken to prevent any vaseline choking the bore of the taps. The iodine solution is poured into the funnel, and any air in the joint between the taps is expelled by pinching the rubber tubing of the joint, tap B being closed.

The apparatus is clamped in an upright position.

Method.—Tap A being open, tap B is set to such a position that drops are delivered from the apparatus steadily at the rate of 1 drop per second; sufficient accuracy can be secured by so adjusting tap B that during a 30 second period of dropping from 28 to 32 drops are delivered. Tap A is then shut. The cadmium-plated article freed from grease by treatment with a grease solvent is held or supported in a sloping position about ¾ inch below the jet, with the surface to be tested at about 45° to the horizontal. Tap A is then fully opened, and the number of drops required to penetrate the coating, as shown by the appearance of a spot of the underlying steel in the middle of the area tested, is noted. This number, divided by 18, gives the thickness of the coating in ten-thousandths of an inch.

The "end-point" can normally be readily detected by the contrast in appearance between the cadmium surface, as dulled by the iodine, and the exposed steel; its distinctness varies, however, with the degree of smoothness of the deposit and the steel base, and also with the type of deposit as determined by the presence or absence of addition agents in the plating bath. Thus deposits prepared from an "addition-agent" bath were found to be blackened by the first few drops of iodine solution, perforation being marked by the appearance of a relatively bright steel spot (see Fig. 2); the surface of deposits prepared from a plain cadmium cyanide bath was rendered dull and dark under the action of the iodine, and at the point of perforation the underlying steel appeared either brighter or darker than the surrounding metal, according to its degree of polish.

Notes on the Method.—1. Any adjustments to the rate of dropping, should be made with tap B, tap A being used only for starting and stopping the dropping. An unsteady rate of dropping indicates foreign matter in the bore of the taps, which should be removed by cleaning; in this connection, good filtration of the iodine solution is essential.

2. The area to be tested should measure not less than ½ x ½ inch, and if the surface is curved, the radius of curvature should be greater than 1/16th inch.

Accuracy.—The accuracy would appear to be with ± 15 per cent.

Ammoniacal Ammonium Persulphate Stripping Method

Cadmium coatings have been found to be readily soluble in the following solution, while steel is not noticeably affected.

Solution.—A 5 per cent. aqueous solution of ammonium persulphate, to which is added 10 per cent. by volume of concentrated ammonia solution (sp. gr. 0.88). The solution should be freshly prepared.

Method. Determination by Loss in Weight.—The weighed specimen is immersed in the solution, which is stirred occasionally until the coating appears to be completely dissolved off. The specimen is then removed, washed, dried and weighed, the thickness of the cadmium coating being calculated as in the case of the antimony chloride stripping method (loss in weight). The progress of the stripping can normally be seen without difficulty, but in case of doubt as to its completeness, the specimen may be returned to the stripping solution for a further period of immersion. The time required for stripping depends largely on the thickness of coating and amount of stirring. The same solution may be used for several successive tests, but as it becomes exhausted, the time for stripping is prolonged. The accuracy of this method is proportional to the accuracy of measurements of weight and area.

Summary

The chief factor determining the efficiency of cadmium coatings for the protection of steel articles would appear to be the thickness of coating. Methods for the rapid determination of thickness have been developed, and their accuracy and that of an existing method has been investigated. The methods, which are applicable in different cases, are:—

1. The iodine dropping method, in which the thickness is obtained from the number of drops of a specified iodine solution required to perforate the coating. The method has been found to be accurate to ± 15 per cent., and is applicable to most cadmium-plated surfaces, exceptions being surfaces of small dimensions.

2. The hydrochloric acid-antimony chloride stripping method, which has been described in a trade pamphlet, and of which there are three variants, the coating being dissolved off the article by means of the specified solution and the thickness determined from either **(a)** loss of weight or **(b)** reduction in dimensions or **(c)** the time taken for the solution of the coating as indicated by the time of hydrogen evolution. The accuracy of variant **(a)** is proportional to the accuracy of measurement and weight of area; this method would appear to be well adapted to testing small parts, the area of which can be computed with sufficient accuracy, e.g., small rod, rivets and bolts. The use of variant **(b)** is limited, since the reduction in dimensions may be of the order of 0.0001 inch or less, and hence may not be determinable except with small articles of regular shape. Variant **(c)** is very rapid in application, but the results may be in error by as much as 50 per cent., and therefore, may not be sufficiently accurate for most inspection purposes; it may, however, be of value in cases where no better method is applicable, e.g., to provide an approximate rapid determination of thickness of coating on small articles of irregular shape, such as small screws.

3. Ammoniacal ammonium persulphate stripping method. Remarks as for method 2 **(a)** apply.

Chromium Plating Patent Lawsuit

During the latter part of September and the early part of October hearings were held in the case of United Chromium, Incorporated vs. General Motors Corporation, The New Departure Manufacturing Company and The Bassick Company in the United States Court for the District of Connecticut at Hartford. Federal Judge Edwin S. Thomas presided. The Plaintiff, United Chromium, Incorporated, sued all three defendants for infringement of the Fink Patent. The trial took three weeks. The final argument is set for March 15, 1934, and the decision of the Court may be rendered at a later date.

In a previous suit under the same patent against the International Silver Company of Meriden, Conn., United Chromium, Incorporated was the victor in both the District Court and in the United States Circuit Court of Appeals. The decision of these two courts were reprinted in full in **Metal Industry** of September, 1932, pages 355-8; November, 1932, pages 465-8; December, 1932, page 474; February, 1933, page 60.

The Control of Plating Solutions

By W. C. FERRIS

Technical Director, Electroplaters' Technical Institute, Chicago, Ill.

DURING recent years the electroplating industry has begun to wake up to the advantages of control methods which enable them to eliminate some of the many errors which creep into the operation of electroplating plants. A demand has sprung up for accurate and exact methods and apparatus. At the same time, however, laboratory equipment and methods have been offered on many hands which are not up to standard. The most important claim made by their originators is that they give results "close enough for practical purposes." They have only one "talking point"—speed. (For a discussion of the effects of this type of work, see Metal Industry, June 1932, page 243, "Honest Technical Control").

These rapid methods have very definite limits. They cannot be compared with the sensitive and exact methods used in the properly equipped laboratory, under the supervision of a properly trained analyst. The result of making the process of chemical analysis too simple and fast is to rob it of its accuracy which is absolutely essential. The only methods worthy of the name "chemical analysis" are accurate methods.

There are two types of analyses useful to the plater. The first is the control work which enables the operator to check the main constituents of his solutions, and by proper additions, to keep it within very narrow, definite limits. For example, a nickel solution can be controlled by keeping the metal, chloride, acidity, etc., at a uniform point to get the best results. If the solution is known to work best with a metal content of 2½ ounces to the gallon, and the analysis shows only 1½ ounces, it is obvious that the plater must add enough nickel salts to bring the solution up to the full working strength.

The other (and more elaborate) system is to make a complete analysis of the solution. For such work, however, the plater must know not only how to make this complete analysis, but also how to translate his findings into practical working information. He must know enough about chemistry and electricity to apply them to the correction of his troubles; this in addition to the knowledge which he has gained through his years of practical experience.

There are many cases in which routine chemical analysis alone will not give enough information to cure a faulty condition. For example, a nickel solution used for die castings may be correct in its chemical proportions and yet give a black, streaky deposit. It may be that the work was suspended in the solution for a few seconds before the current was turned on. During these few seconds small amounts of zinc and perhaps aluminum were dissolved. If these elements build up day after day, their total reaches a point where the zinc content causes streaky deposits. The simple analysis for nickel content, acidity, etc., will not disclose the presence of zinc, which can be detected only by a special analysis. The experienced plater who has had this difficulty before, of course, knows that it is zinc which has caused it. The definite proof is supplied by a complete analysis of the solution.

An old practice (which is dying out to-day) was to use hydrometers to test plating solutions. It is inaccurate and untrustworthy. Strangely enough, its use persists even though the wide-awake and progressive members of the plating industry know that it has no value. The hydrometer gives no indication of the impurities, no idea of the metal content, no inkling of the acidity. It can be used to a certain extent in electrotyping because only wax molds are plated in this type of shop. But where iron and steel form a part of the work, for example, the hydrometer is useless, as it gives no hint of the presence of excess iron in the solution.

The determination of acidity is an excellent and most important form of control. Such determinations can be made by chemical tests or by color tests in what is known as Comparators. These devices are now so well known as to require no detailed description here. It is vital, however, that platers use some such simple method of checking the acidity of their solutions, as efficient operation is possible only when the acidity is in the correct range. It must be borne in mind, however, that the control of acidity and alkalinity in a plating solution is not enough by itself. Chemical analysis must be used in addition to see that the constituents are up to requisite proportions and that impurities are absent.

The ideal condition in a plating shop is to know everything that is in every solution, metal, chlorides, sulphates, acidity, alkalinity, free cyanide, carbonates, etc.; also that impurities are down to the minimum levels. For such control, a working knowledge is necessary of the methods of chemical analysis of solutions. It is also of great assistance to have a thorough understanding of the fundamentals of electricity and the action which takes place when the current is operating in the solution.

Correction—Electroplating Generators

Last month the following typographical errors occurred in Part 5 of the series, "Electroplating Generators," by Charles J. Schwarz:

Last line of Section 2 (page 343), "Amperes," etc., should read: "**diameter** for a given ampere output."

First line of paragraph 4 of Section 3 (page 344), "Axial," etc., should read: "The first step in determining the axial **length**" etc.

Readers saving the series should note these changes.—Ed.

Quality Marks for Watch Cases

THE watch case industry through its trade association, The National Watch Case Manufacturers Association, New York, has drawn up a code of fair competition, some of the articles of which are of great interest to the general metal manufacturing trades.

In the matter of wages, hours and child labor, the code is similar to most of the others throughout industry. Employment of any person under 16 years of age is prohibited, with the proviso that where a State law specifies a higher minimum age, no person below that age shall be employed within that State. Maximum hours are 40 per week or 8 in any 24-hour period, with exceptions allowed for seasonal peak periods. The minimum wage is $14.00 per week of 40 hours.

The sections under trade practices include very interesting specifications of quality marks which are quoted below.

The following practices constitute unfair methods of competition within the meaning of Subsection (b) of Section 3 of the National Industrial Recovery Act, and are prohibited.

To manufacture or to offer for sale any watch case in or on which he has not indelibly and legibly stamped a quality mark in accordance with the following standards and conditions.

(1) No watch case may be stamped, tagged or described with the quality mark "Gold Filled" unless the sheet of gold affixed, brazed or fused to the outer surface of the back, center, lugs, open face bezzle, pendant, crown and bow shall be three one-thousandths of an inch in thickness as a minimum; and unless the sheet of gold affixed, brazed or fused to the inner surface of the back, the inner and outer surface of the cap, and the outer surface of the hunting bezzle shall be one one-thousandths of an inch in thickness as a minimum. In no case may the words "Gold Filled" be abbreviated.

(2) No watch case may be stamped, tagged, or described with the quality mark "Rolled Gold Plate" unless the sheet of gold affixed, brazed or fused to the outer surface of the back, center, lugs, open face bezzle, pendant, crown, and bow, shall be one and one-half thousandths of an inch in thickness as a minimum. In no case may the words "Rolled Gold Plate" be abbreviated.

(3) No watch case below the standard of quality defined in subsection (2) above shall be stamped with the word "Gold," and/or any mark indicating karat fineness or with any colorable imitation of the word "Gold" or with any coined compound thereof, or with any mark simulating a karat mark.

(4) No watch case shall be stamped with any karat mark unless it shall be of a quality of 10 karat fineness as a minimum.

(5) No watch case may be stamped with any word or words or form of words denoting quality including the word "Quality" itself, except as provided in the foregoing subsections of this paragraph.

(6) No manufacturer shall make or offer for sale any watch case which does not contain platinum, gold or silver in quantity as determined by the Code Authority, unless he shall stamp legibly and indelibly on the inner surface thereof the words "Base Metal." In no case may the words "Base Metal" be abbreviated.

Chromium from Various Solutions

During the past few years, chromium plating has been extensively applied wherever a bright, tarnish-resistant surface is desired on metals; for example, in the automobile industry. The solutions now used for this purpose consist essentially of chromic acid. The electrical efficiency of plating from this type of "bath" (plating solution) is low, and it is difficult to plate irregularly shaped articles with a uniformly bright deposit. Still, good plating is done, largely due to ingenuity in conducting the plating operation.

It would be highly desirable to obtain a chromium plating bath that would have a higher efficiency, a wider range for bright deposits, and a good "throwing power", that is, ability to plate into recesses. In a search for such a bath the Bureau has investigated other types of chromium solutions including chromic sulphate, chromic fluoborate, and chromous sulphate. The results, as set forth in Research Paper No. 604 to be published in the October number of the Bureau of Standards Journal of Research, showed that while it is possible to obtain bright deposits from these baths, they are inferior in all the above respects to the chromic acid bath. With existing knowledge, there is very little prospect of developing a bath that will be superior to the present chromic acid bath.

Sheet Copper Output

Q.—Will you kindly give us the United States production of copper in sheets and rolls, tinned on one side; tinned on both sides; and leaded on both sides.

A.—The answer to your question can only be approximate. There are some 10 or 12 copper sheet mills in the United States that the writer has knowledge of, and based on the known production of several of these mills in 1932. We would put the total production, without classification, at about a million and a half sq. ft. There is no pretense at accuracy in stating these figures, but we would say they were the minimum.

Regarding leaded copper sheets, the problem is more difficult, as many firms such as Lamb and Richie of Cambridge, Mass., and the Leadcote Products Company of Everett, Mass., and others, buy the sheets from the copper mills and lead coat them for the market.

A letter from one of the largest copper producers of sheet copper, dated 1930, states that in that year they produced more than 50,000 lbs. of rough lead coated copper. Assuming this to be 16 oz. copper, this would be some 50,000 sq. ft. for one firm.

W. J. PETTIS.

Fabricating the World's Largest Valves

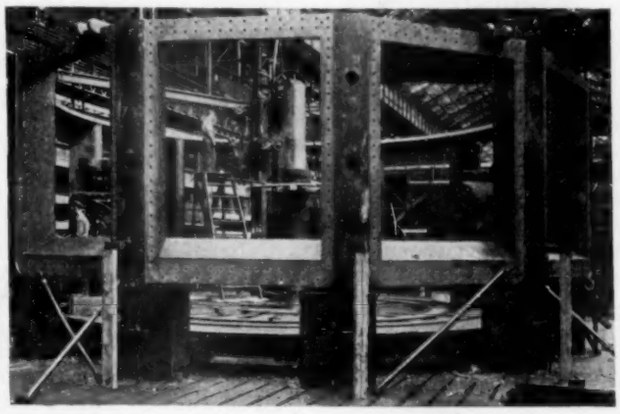
MORE than four million pounds of steel and special materials are required in the production of the world's largest valves at the East Pittsburgh, Pa., Works of the Westinghouse Electric and Manufacturing Company, and to ship them to the Boulder Dam will require about ninety railroad cars. A total of eight gates, two in each intake tower will control the flow of water to the power plant developing 1,835,000 horsepower. With the exception of the cast steel throat liner and the small deflection plates, each gate is fabricated entirely by arc welding. Eighty welders were trained for this job.

In the construction of the gates, over 4,600,000 pounds of materials were used, including steel plate, steel castings, bronze, copper, stainless steel and monel metal. More than one mile of welding is used in the fabrication of one gate. Each gate assembly consists of a throat liner, a cylindrical valve, a nose liner, valve guides and minor fittings.

Monel metal was used for the seats making the water tight seal between the gate valve and the throat and nose liners. These are very carefully machined, 110,000 pounds of the alloy being used for the purpose. Adjusting screws are provided for obtaining a perfect seal and locking into position on the upper seat only of each gate.

The entire lower gate including the stationary and movable parts weighs 523,858 pounds. Each lower gate valve weighs 240,300 pounds, and each upper gate valve weighs 150,000 pounds. The following list of materials used gives an indication of the magnitude of the job:

	Pounds
Copper-bearing steel plate	3,440,000
Ferrous castings	850,000
Bronze strips and castings	87,500
Monel metal seats	111,240
Monel metal screws and bolts	15,000
Stainless steel bolts	34,000
Steel bolts, studs and nuts	30,000
Structural steel shapes	14,500
Welding rod	20,000
Total	4,602,240



A FINAL machining operation on one of the nose liners for the Boulder Dam valves. This mammoth 22,000 pound frame is 11½ feet high and 37 feet in diameter. It is composed of six all welded segments bolted together. For this boring operation the liner is bolted stationary while the mill carrying the tool posts rotate, finishing the inside diameter preparatory to mounting the monel metal seats. The cylindrical valve will slide inside allowing the water to enter through the openings. This principal stationary member will be imbedded in the concrete of the intake towers. The holes in the faces are for bolting to the eight-foot long entrance liners.

Plate for Phosphor Bronze

Q.—Will you please advise what you consider to be the most satisfactory plating for phosphor bronze spring strip to prevent tarnishing and corrosion of either the phosphor bronze or the plating under severe atmospheric conditions. We do not consider either cadmium or nickel plating to be satisfactory.

The articles which we desire to plate and to maintain free from corrosion are electrical plug connections which must remain free from corrosion so as to maintain low contact resistance. In giving consideration to this subject, would suggest that you keep in mind the possibility of electrolytic corrosion as well as corrosion from elements in the atmosphere.

A.—We know of no electroplate that will meet your requirements. Chromium or rhodium would not be suitable due to the high resistance they would set up at the contacts. Gold would be expensive and wear off. It is the guess of some of our experts that aluminum bronze or beryllium copper might do the work. It is claimed that these alloys will not tarnish and that they resist corrosion as well.—G. B. H.

EDITORIALS

The Capital Goods Industry

DURING the past three years, in the pressure for economy in all directions, one industry has suffered more than almost any other—the capital goods industry which builds plants, and manufactures machinery and equipment.

Of course, during any period of depression, expansion goes by the board. And rightly so. There is no need for additional capacity when present equipment is more than sufficient. But as always, the swing has gone too far. The expenditures for machinery during this time have been only a fraction of what they should have been to maintain plants in even a fair degree of efficiency. Consequently, the present condition of our industrial equipment is far below the minimum needs for efficient operation.

What are the figures of machinery output? The machinery industries in 1929 employed 830,000 men and paid them $1,400,000,000 in wages. They constituted one of the largest and highest-wage-paying industries in the country. And they have fallen to two-thirds below their peak.

It is evasive to say that we cannot buy because we do not need new machinery. We do need new machinery, not to increase capacity, but to improve the quality of the output, the efficiency of operation and the cost of manufacture.

We are trying to return to prosperity by means of shortened hours and increased wage rates. If these efforts result in greatly increased prices to the consumer, they will fail in their object of increasing consumption. Prices must not go sky high, and the only way to keep them within reason is by the use of the best facilities and equipment.

We shall not see the end of hard times until the capital goods manufacturers, the builders of improved machinery, are busy.

Scrap and the Copper Market

THE fluctuations in the prices of raw materials have come home to the metal trades with striking force, especially in the copper industry. This is exemplified in a recent resolution by some Montana copper producers, (the Silver Bow Trades and Labor Council of Butte, Mont.) which cites a recent fall in the price of copper from 9 to 7¼; it attributes the drop to domestic sellers dealing only in scrap copper, which is produced by "junkmen" who employ little labor, at low wages and long hours, and who, it is stated, have increased their production from 20 per cent of domestic consumption to 50 per cent; and that a curb should be put on scrap producers to restrict their production to about 20 per cent of their former output, the same proportion as the copper producers have put into effect.

It must be admitted that the continued flow of secondary copper in full volume would have a depressing effect upon the market when primary production is sharply restricted. It is one thing, however, to order scrap metal men to stop producing, and it is another to put this injunction into effect. Mines can be operated at will. If the mine is not running the metal stays in the ground. Scrap, however, is constantly being produced by industry and the general public. Even under reduced industrial activity, scrap continues to flow.

Shall the secondary smelters and the refineries which buy scrap, refuse to take it? If they do, it will continue to pile up in the yards and bins. The improvement in the price of copper resulting from the refusal to smelt this material and place it on the market in ingot form is likely to be short-lived as the knowledge of a scrap pile overhanging the market and ready to flood it at the first sign of improved conditions will automatically tend to keep prices from rising.

It must be remembered that the flow of scrap is in fairly direct proportion to the activity of industry. In dull times it is slower and in better times it is faster. Does not this automatically take care of the relation between scrap and new copper? Providing of course that primary copper is produced in sensible proportions gauged to the activity of its markets.

There has long been a feeling that the troubles of copper producers have been due not only to depressed markets but to their own lack of ability or interest in adjusting their output to their sales possibilities. This has resulted in huge stocks of refined but unsold copper. Such a condition is hardly possible in the scrap industry as its sources of supply are automatically limited by the state of trade (with the exception of course of abnormal situations like scrap collected after the war).

It seems to us highly impractical to attempt to limit the production of ingot metal. The nature of the industry sets its own limits by reducing the flow of raw material in proportion to industrial activity. At the same time, scrap production cannot be stopped without stopping industry itself. It would be more in order for copper producers to settle their differences and put their own house in order.

Electroplating Research

IN spite of severely reduced appropriations by the Federal Government, the Bureau of Standards has continued to carry on its important projects. In a paper read at the Chicago Convention of the American Electroplaters' Society in June, 1933, Dr. Blum summarized the work done on electrodeposition in a report full of interest to the industry.

Three papers have been published, the subjects covered being The Theory of Chromium Deposition, A Metal Connected Glass Electrode, and a Progress Report on the Protective Value of Electroplated Metal Coatings on Steel (the last named reprinted in **Metal Industry** for February, 1933).

Several research projects are now being carried on. The largest is, of course, the exposure testing for the protective value of electroplated metal coatings on steel. In connection with this work the Bureau is also carrying on accelerated tests in an effort to see if they will predict the behavior under atmospheric exposure, and also stripping tests which will be of value for the analytical testing of plated coatings and for stripping prior to replating.

An investigation is being made into the deposition of chromium from solutions of chromic and chromous salts. The results so far seem to indicate, however, that the development of a bath superior to the chromic acid bath does not appear promising.

A study has been made of the methods of analyzing tin plating solutions, especially alkaline baths, preparatory to undertaking the study of tin deposition.

An investigation has been made into the decomposition of cyanide plating solutions, prior to an investigation of silver plating.

The Bureau has also given assistance to several committees in the preparation or revision of Federal Specifications that include plating. Special requirements have been set up in order to elicit comments and suggestions from interested parties before they are finally promulgated. Among these are specifications for silver plated flatware, to have an average deposit thickness of 0.00125"; plumbing fixtures to have 0.0002" of nickel, followed by 0.00002" of chromium, on brass. On nickel silver, the Bureau recommends the application of 0.0001" chromium directly.

The Bureau is now active in the testing of metal coatings on Federal purchases which include zinced (galvanized) iron, tin and Terne plate, zinc plated conduit, chromium plated plumbing fixtures and hardware, and silver plated tableware. Among its miscellaneous activities is a study of the anodic oxidation of aluminum and especially the factors that affect the stability of the baths and the quality of the coatings.

Even a hasty glance at the above schedule proves that the work of the Bureau is fundamental to the well-being of electroplating. Even from the most practical standpoint such projects as the investigation of the protective value of electroplated metal coatings on steel, are of the highest importance to the industry.

Gold and Industry

Under the new policy of the Federal Government, to buy gold in the United States and abroad at a price above the London quotations, the first visible effect has been to raise the price of metal. At this writing, gold is selling for $32.26 per ounce, (November 1).

What will be the effect on American business? We are all in the dark. Still less can we predict the effect on world business. We may have reprisals from abroad due to disagreements with our policy.

Only one thing is certain—that gold has gone up in price and may go up further. The first industries to feel it are jewelry manufacturing and gold plating. Perhaps the rise will tend to discourage the use of gold in the arts. Perhaps platinum will become more popular if gold passes it in price. Perhaps silver will be more widely used. Perhaps . . . . . .

The manufacturing jewelry industry must be prepared for changes.

Business or Strikes

THE state of trade is still the most important topic of the day. In our own field, scattering reports from New England, the largest single center of metal manufacturing and metal coating industries, seem to show a fair retention of the improvement which occurred in the spring and summer. Employment is greater and output is also considerably larger among the brass manufacturing companies and the electroplating supply houses. An indicator of the situation with the huge corporations which operate nationally over a wide variety of fields is the report from the General Electric Company that orders received during the third quarter of the year amounted to $43,733,499 compared with $35,539,858 for the second quarter, and $25,665,402 for the third quarter of the year 1932. A report from the Austin Company, engineers and builders, shows that contracts for the third quarter of this year were 280 per cent greater in dollar volume than in the third quarter of last year. Among the lines active in construction work are foundries, brass plants, chemicals and metal containers. This is particularly interesting because it covers expenditures for capital goods—an industry which has been in worse straits than almost any other.

We seem to be holding some if not all of the gain made in the upward rush of the summer. We have with us, however, concurrently, the plague of all periods of emergence from depression—strikes. Although accurate statistics are not in hand, it is safe to say that there are more strikes at this time than during the past two or three years together.

It is a generally acknowledged fact that recovery depends upon the intelligent participation of labor as well as capital. Just as employers have had responsibilities placed upon their shoulders to raise wages, shorten hours and keep prices down to the minimum, so labor also has its responsibilities, and the first of these is that force—the strike—should be used only as the very last resort. There are adequate provisions for dealing with management and capital. There is machinery for presenting and eliminating grievances. Both business and the Government stand ready to take up any situation which is not satisfactory. For those reasons the use of the strike as the first resort is absolutely unjustified.

For the conduct of labor, the country looks to its leaders. If this leadership is intelligent and constructive, recovery may continue. If it is selfish and narrow, and thinking only of the momentary gain, no program for betterment will have a fair chance to succeed—and labor is sure to be among the heaviest losers.

Shop Problems

This Department Will Answer Questions Relating to Shop Practice.

ASSOCIATE EDITORS

Metallurgical, Foundry, Rolling Mill, Mechanical

H. M. ST. JOHN — W. J. PETTIS
W. J. REARDON — W. B. FRANCIS

Electroplating, Polishing, and Metal Finishing

O. J. SIZELOVE — A. K. GRAHAM, Ph.D.
G. B. HOGABOOM — WALTER FRAINE

Antique Brass

Q.—We are sending you a brass handle with an antique brass finish. We are unable to produce this finish at a moderate cost, and we are writing to see if you can simplify the process for us.

A.—The brass handle can be finished as follows:

After the buffing operation, clean in an alkaline cleaning solution, rinse in clean cold water, and oxidize in the following solution:

White arsenic	16 oz.
Caustic soda	16 oz.
Sodium cyanide	6 oz.
Water	1 gallon

Operate the solution at 80° F., and use steel anodes with a low current density.

After oxidizing, relieve lightly with a rag or steel wire wheel, using fine pumice stone moistened with water. Dry and lacquer to protect finish.

O. J. S., Problem 5,241.

Bluing Guns

Q.—We want formulas for bluing guns, rifles, revolvers, etc., preferably by use of chemicals.

A.—To refinish guns and rifles, the first operation is to remove the old finish and repolish the base. The old finish can be removed by using a hot muriatic acid solution. Use the acid full strength, and rinse thoroughly in clean cold water; then dip in a cyanide bath to neutralize any remaining acid; rinse in clean cold water, then in hot water; dry thoroughly.

After the polishing operation, clean in an alkaline cleaning solution to remove polishing grease and dirt; then immerse in the following solution:

Ferric chloride	2 oz.
Mercury nitrate	2 oz.
Muriatic acid	2 oz.
Alcohol	8 oz.
Water	8 oz.

After the work is left in this solution for a few minutes

USE THIS BLANK FOR SOLUTION ANALYSIS INFORMATION

Fill in all items if possible.

Date.....

Name and address: .....**Employed by:** .....

Kind of solution: .....**Volume used:** .....

Tank length: .....**width:** .....**Solution depth:** .....

Anode surface, sq. ft.:.....**Cathode surface, sq. ft:** .....

Distance between anode and cathode: .....**Kind of anodes:** .....

Class of work being plated: .....**Original formula of solution:**.....

REMARKS: Describe trouble completely. Give cleaning methods employed. Send small sample of work showing defect if possible.

Use separate sheet if necessary. _____

_____

_____

_____

NOTE: Before taking sample of solution, bring it to proper operating level with water; stir thoroughly; take sample in 2 or 3 oz. clean bottle; label bottle with name of solution and name of sender. PACK IT PROPERLY and mail to METAL INDUSTRY. 116 John Street, New York City.

it is taken from the solution and hung up to dry for 10 to 12 hours. Repeat the immersion and drying operations. Then place the work in boiling water for an hour or so and let dry. Scratch brush lightly with a fine crimped iron wire wheel which will remove the rust and produce the finish. A light oiling with paraffine or linseed oil will darken the finish. Remove excess of oil with a soft cloth. This method is quite lengthy and somewhat costly, but the finish is quite durable.

Another method that is cheaper and faster is to plate in a black nickel solution for 10 to 15 minutes. Use the following formula for the black nickel solution:

Double nickel salts	8 oz.
Sodium sulphocyanide	2 oz.
Zinc sulfate	½ oz.
Water	1 gallon

Use nickel anodes with ½ to ¾ volts.

The oiling operation is used with this finish also.

O. J. S., Problem 5,242.

"Greaseless" Griddles

Q.—What is the alloy used for casting so-called "greaseless" griddles. I think it is a special alloy or treatment of aluminum that makes unnecessary the use of grease by the cook.

A.—The alloy generally used for the so-called "greaseless" griddles is composed of 95% aluminum, 5% silicon. No special treatment is required other than a good polish. You can make this alloy or purchase it in the ingot.

W. J. R., Problem 5,243.

Black Finish for Zinc

Q.—We enclose a zinc plate which has some kind of oxidized black finish or deposit. We would like to know if there is a solution for this effect.

A.—The following solution will produce a black finish upon zinc:

Nickel chloride	4 oz.
Ammonium chloride	6 oz.
Ammonium sulphocyanide	2 oz.
Zinc chloride	½ oz.
Water	1 gal.

The solution is operated at 100 to 110°F., and after the black color is produced a light dry scratchbrush operation will intensify the color.

The sample submitted was lacquered after treatment.

O. J. S., Problem 5,244.

Silver Solution Analysis

Q.—We are sending you samples of two silver solutions to be analyzed.

The silver anodes become very soft and crumble up like grains of salt. The voltage is 1½.

Our analysis shows very high cyanide content. We believed that too great an amount of cyanide would cause the anodes to be smooth and bright. If the cyanide content is too high, could silver cyanide be added so that it would not be necessary to discard the whole solution?

A.—Analyses of silver solutions:

	Metallic silver	Free cyanide	Carbonates
No. 1	3.15 oz.	19.18 oz.	8.05 oz.
No. 2	3.07 oz.	13.20 oz.	8.54 oz.

The free cyanide contents of both solutions are entirely too high. We would suggest that these solutions be sent to a refiner and new solutions made.

You can reduce the free cyanide content by adding silver cyanide or silver chloride, but it will require so much of either silver salt that it is cheaper to make new solutions.

O. J. S., Problem 5,245.

Quality of Plating Job

Q.—We are sending you a piece of chromium plated work and wish you would give this any test you care to make, and let me know if you consider it an average job. It was plated 15 minutes in cyanide copper bath, buffed, plated 1 hour in nickel bath; then chromium plated 2½ minutes. We use a nickel bath made with single nickel salts, and it tests 2¼ oz. metallic nickel, 2¼ oz. chlorides, and a pH 5.8.

We did an auto job a short time ago, and the customer complains it is showing rust on most of the steel parts. The sample on the way to you was plated exactly like the job in question.

A.—We stripped the deposits from the sample that you sent to us and our candid opinion is that the deposits of copper and nickel are not heavy enough for a first class job.

The deposit of nickel in the recessed part was about one-half as thick as it was on the edge, showing that the throwing power of the nickel solution is quite poor. We would suggest that you increase the metal content of the solution by adding 4 ozs. of single nickel salts to each gallon of solution.

For a first class finish we would recommend that the steel work be copper plated for an hour, then copper color and nickel plate for 1½ hours, nickel color and chrome plate for at least 5 minutes. If your solutions are in good operating condition then the above length of time for each deposit should be sufficient for first class work.

O. J. S., Problem 5,246.

Soldering Jewelry

Q.—We are having trouble getting a suitable flux to use in soldering nickel-silver joints and catches to the backs of cast metal ornamental brooches. The fluxes we have tried blow when the torch is applied, thus shooting away most of the solder. Samples of work are enclosed.

A.—If you have tried all the fluxes available in your locality, we suggest that you make a try of some of the special fluxes, such as the metal bond tinning compound prepared by certain makers (names on application to us). Also try calcined borax, which is ordinary borax heated in an iron pot to drive off the combined water. The residue of this is pulverized.

We also suggest that you try the electric method of assembling these parts by the 100 or gross. First tin the nickel parts all over by treating them in a hydrochloric acid bath and immersing them in molten tin or low-melting solder. Large batches could be handled in this process. Assemble the parts on boards as in the old process. Perhaps no additional solder or flux would be needed. However, if more solder than that on the tinned joints and catches is found necessary, add a drop of the same solder as used in tinning, with or without a speck of pulverized rosin to do the trick.

The heating could be done, not by a torch, but by the application to the whole board for a few seconds of an electrically heated plate—such as a rectangular faced smoothing iron. This plate would not only heat the joints and catches, but it would apply a pressure that sweats the solder in the joints just as is done when sweating large pieces together by applying a soldering iron. As the joints and catches are not exactly of the same height, the mounting boards should be made to allow for adjusting all the pieces to the same plane surface of the electric heater. Try the method of tinning all over and electric heating with pressure on a few pieces. It should eliminate breakage 100%, be faster than the present method, and possibly cost less.

J. M., Problem 5,247.

Equipment

New and Useful Devices, Metals, Machinery and Supplies

Belke Polishing Lathe

The Belke Manufacturing Company, 947 North Cicero Avenue, Chicago, Ill., has perfected the Belke polishing lathe. The maker states the machine embodies in its manufacture years of experience, months of careful research work, thorough tests in the laboratories, and features that only a polisher with many years of experience can realize. Some of the advantages claimed are:

Safety wheel nut to protect the threads; flat top threads holding buffing wheels in place; large one-piece nickel steel spindle, accurately machined to

New Belke Lathe

perfect balance; removable pulley hood; hexagon nut covering end of bearing housings; rigid base-gooseneck design; multi-V belt drive; weight complete, 925 pounds.

Alloy for Water Pipe

A new type of ternary lead alloy water pipe which is designed to lower building costs and show greater resistance to damage than ordinary lead pipe, is being exhibited for the first time by the British Non-Ferrous Metals Research Association at the Shipping and Engineering Exhibition which opened in London, September 7, 1933.

The new alloy pipe has two-thirds the weight of lead pipe of similar capacity. It is made from alloys having a tensile strength 60% greater, and resistance to vibration (a main cause of pipe bursts) 300% to 400% greater than their lead equivalents, it is claimed. Composed of 98.25% lead, 1.5% tin and 0.25% cadmium, or of 99.25% lead, 0.25% cadmium and 0.50% antimony, they have in many cases a resistance to corrosive water greater than lead itself, it is stated. A saving of 15% to 20%, it is claimed, can be effected by employing the new ternary lead pipes in house building.

The new type of pipes, according to the Association, is being increasingly used in Great Britain, and has been officially sanctioned for water conveyance.

Other uses for the alloy include cable sheathing, which has proved highly successful under conditions of service involving vibration, and glazing bar sheathing for window frames, it is stated.

New pH Analytical Set for Nickel Solutions

Kocour Company, 4724 South Turner Avenue, Chicago, Ill., announces its new Model BCP analytical set for determination of pH of nickel plating solutions. The set has a pH range of 5.2 to 6.6, covering all ordinary nickel baths. Sets can also be supplied for wider range of acidity.

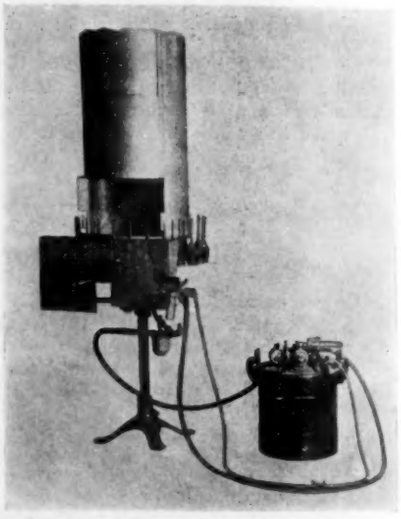
The BCP set, according to the maker, is a portable outfit for operation at the tank. Simple directions can be followed by anyone, it is stated. It provides a means of definitely controlling the acidity, which is a necessity for accurate plating solutions control and productions of deposits of proper character, color, etc., especially in nickel plating preparatory to chromium plating.

Set consists of eight color standards, sealed tube of water, three graduated test tubes, graduated dropping pipette, bottle of indicator solution, brush and direction card, all contained in hardwood, brass-mounted box. Replacements are always available, it is stated.

New Kocour pH Set

New Rotary Sprayers

Manufacturers of small and medium sized articles will be interested in the new Type YBA and YBB rotary spray finishing machines, recently placed on the market by the DeVilbiss Company, Toledo, Ohio. Although capable of an approximate hourly production of 1000 to 3600 small, light weight articles such as electric light bulbs, golf balls, bottles, jars, automobile parts, electrical and radio parts, spools, toys, ceramic ware and innumerable small light weight articles, these machines are moderate in cost, economical to operate, light in



New DeVilbiss Rotary Sprayer

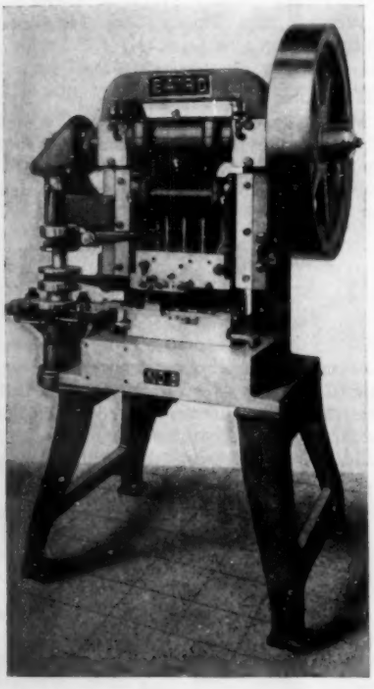
weight and highly compact, according to DeVilbiss. The machines are said to meet practically any requirement where size, weight and location are determining factors, and where intermittent or limited production does not justify larger machine.

The Type YBA and YBB are identical except that the former is air motor driven and the latter electric motor driven. Automatic loading and unloading mechanism can be supplied if desired. This may be coordinated with the conveyor system eliminating necessity of an operator except for occasional inspection and refilling material tank. The machines can be equipped for either manual or automatic spray gun operation.

The Type YBA and YBB have a standard 24-inch turn-table, but may be equipped with 30, 36 or 42 inch tables. Likewise, 24 spindles are standard equipment, but any number from 18 to 48 may be used, depending on diameter of turntable.

New Automatic Multiple Transfer Press

The Baird Machine Company, Stratford Avenue, Bridgeport, Conn., offers a new automatic multiple transfer press in six sizes, with work range, based on maximum metal width and length of feed of 1½ inch metal and 1 inch feed for the smallest machine, up to 6 inch metal and 5 inch feed for the largest; and running in weight from 1100 pounds for the smallest to 8700 pounds for the largest. The No. 3 size shown here takes metal up to 2 inches wide and has maximum feed of 1½ inch; it weighs 2200 pounds. Features mentioned by the maker include: Independent grip, slide feed for metal; various operations can be done in the metal before blanking; blanking punch enters die only enough to cut blank; positive transfer of blank to several operations; transfer grips hold work until removed by

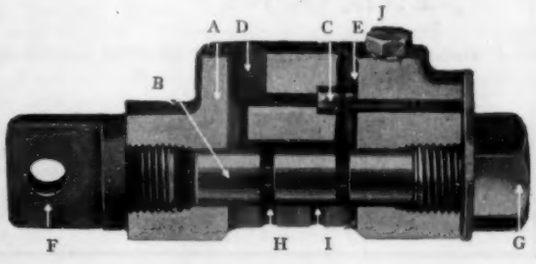


New Baird Press

punches; independent adjustment for each punch; simple removal and resetting of tools without disturbing adjustments.

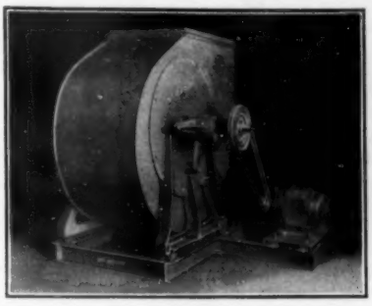
The presses are supplied for either belt drive or with motor drive arrangement.

Bulletin 210 completely describing these presses is available from the maker.



"Berkshire" Valve Type Vibrator

A, Body; B, Piston; C, Bronze By-Pass Valve; D, Intake from Air Line; E, Combined Exhaust and Intake Port; F, Plate Head; G, Hex Head; H and I, Exhaust Ports; J, By-Pass Valve Guide Screw.



Buffalo Silent Fan Base

New Foundry Vibrator

A bulletin recently issued by the Berkshire Manufacturing Company, 1101 Power Avenue, Cleveland, Ohio, describes some novel features in the company's latest design of patented foundry vibrator. These features are stated to entirely overcome certain troubles met in vibrator operation and maintainance. Elimination of piston springs prevents damage and of failure to start through spring breakage. All air passages are accessible and readily cleaned by pushing a wire through the vibrator body. Wear on the piston ends is substantially reduced by eliminating stop-pins and utilizing entire area of heads as bumping surface. Because of the by-pass valve, the grooves in the hardened and ground piston can be located farther apart, reducing air leakage through wear. The vibrator is designed for usual 80 lb. air pressure, but will operate efficiently on pressures as low as 30 lbs. per square inch, the maker states.

The illustration below shows how by-pass replaces the usual piston spring. The air enters the intake port D, pushing back the bronze by-pass valve C, and starts the piston in the usual manner, exhausting the air through the ports H and I alternately. On shutting off the air, however, the valve C closes the passage from D and acts as an exhaust valve for the air still in the piston port passage. The piston is thus automatically returned to the correct position for re-starting. The manufacturer states that the small amount of maintainance required, and the satisfactory continuous or intermittent operation, permits use of this design on many special vibrating jobs besides foundry work.

Complete data on this equipment is available by writing this journal or the manufacturer.

Silent Base for Buffalo Ventilating Fans

The new Buffalo silent floating base has been developed to remove the last traces of motor hum normally picked up and magnified by fan bases and foundations. An audiometer was used in perfecting the new base, which is made by Buffalo Forge Company, Buffalo, N. Y. It provides a practical, inexpensive means of insulating a fan and its driving motor from building foundations, the maker states.

Flexible rubber insulators, so designed that there is no metal contact between bolts holding down base and fan, provide a damping effect. Rubber used in these insulators is in shear, which is considered better than in compression as the life of the rubber is maintained over a long period.

Heavy Material Spraying and Sandblast Equipment

Extension of processes for pneumatic application of concrete, cement-sand mixtures, and refractory substances is made possible through development of

Gunitor Equipment

new machines for such purposes by the Gunitor Company, Elkhart, Ind. This apparatus is said to be relatively low-priced, light in weight, lower in height, and to include many refinements in design and construction.

Among the uses of pneumatically applied material are repair or restoration of all types of concrete, brick, tile, masonry and wooden structures; for reservoirs; fireproofing; for repairing fireboxes, furnaces, cupolas, etc., with refractory substances; and for sandblasting.

"Gunitors" are said to make such apparatus available for many smaller jobs than could heretofore be done economically. The machines are offered for sale or lease without royalty or commission. The "Gunitor" line gives a large selection of apparatus especially adapted to industrial and contracting

requirements, including types which can be charged by one man and operated from a remote position.

The machines are also available for sand blasting with either dry or wet process. In the latter case, ordinary building sand can be used. New nozzles permit introduction of water, so as to triple amount of work which can be done per foot of air used it is stated. The machines are said to be especially successful in cleaning oily, tarry, painted and soft or sticky surfaces, and in removing marine growth.

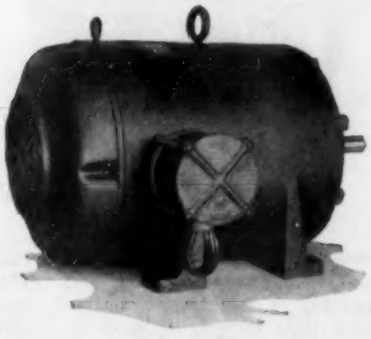
The Gunitor Company, Elkhart, Indiana, has issued circulars describing in detail thirteen models.

New Molding Machines

A new molding machine said to be especially suitable for deep work requiring both jar and squeeze actions is announced by Tabor Manufacturing Company, 6225 Tacony Street, Philadelphia, Pa. It is the Jar Rollover Squeezer, with 14x16 inch table, handling flasks up to 14x30 inches. It has hand-operated flask clamp and a simple mechanism for leveling molds preparatory to drawing patterns. Pattern draw is 8 inches. Jarring is controlled by a knee pad. The Machine is equipped with vibrator, blow valve and pressure gauge. The maker states the new equipment is especially applicable to brass foundries.

"Ideal" Totally Enclosed Fan-Cooled Motor

The Ideal Electric and Manufacturing Company, Mansfield, Ohio, has developed a new totally-enclosed, fan-cooled



New "Ideal" Motor

motor. It is fully protected with all the advantages of dust-tight construction, and is the same size as the ordinary open-type motor of same rating, the maker states.

The construction employs two shells, —the inner shell being dust tight and enclosing windings and rotor. Tight sealing is obtained by machined metal to metal stationary joints with long, close fits—no running seals. A fan mounted outside this shell forces a blast of air between the inner shell and the outer one, thereby providing effective cooling, it is stated.

Equipment and Supply Catalogs

Protection of Workers Exposed to Chromium and its compounds. In industrial work, exposure to chromium and its compounds, either through contact with the dry material, with solutions, or with dust and vapor in the air, often causes troublesome, though not serious effects of various types of workers. Because of the increasing number and diversity of uses of chromium and its compounds, efforts have recently been renewed towards methods of protection of exposed workers. The Industrial Health Section of the Metropolitan Life Insurance Company, New York, has completed a study of causes, effects and preventive measures, which has been published in illustrated pamphlet form under the title above. This is a careful scientific analysis of the problem, phrased in everyday language which will be understood by such non-technical key men as plant superintendents and individual department foremen, as well as by the management of plants in which chromium processes are employed. Discussing preventive measures, the report states that **"the harmful effects from chromuim compounds can be wholly eliminated or reduced to a minimum so that the risk becomes negligible. The responsibility is equally divided between the management and the worker."** (1)

Product Design. The New Jersey Zinc Sales Co., 160 Front St., New York. "Case Histories in Product Design," by T. J. Maloney and George Switzer; reprinted from "Product Engineering" 1933. A very well illustrated booklet on a subject of interest to manufacturers of a great many types of products. (2)

Chromium Platers' Anodes. Alpha Metal & Rolling Mills, Inc., 363 Hudson Ave., Brooklyn, N. Y. Specification sheets, with considerable information on chromium plating anodes. (3)

Plating Racks. Belke Mfg. Co., 321 S. California Ave., Chicago, Ill. Leaflet on rubber armored racks, hooks and tips for platers. Illustrated. Also available is a 32-page catalog of these products. (4)

Metal Cleaner. MacDermid Incorporated, Waterbury, Conn. Booklet on Grade "R" Metex, a new product for all-round application. The booklet also lists other Metex cleaners for specific uses. (5)

Chemical Price List. R. & H. Chemicals Department, E. I. Du Pont de Nemours & Co., Wilmington, Del. Quarterly list, October, 1933. (6)

Chemical Price List. Charles Cooper and Company 194 Worth Street, New York. Industrial and laboratory chemicals, paints, pigments, etc. Free on request. (7)

Aluminum Coloring Process. United States Research Corporation, 40-35 21st St., Long Island City, N. Y. Leaflet on "Coloral" process of oxidizing and coloring aluminum and its alloys. (8)

Thermometers and Pressure Gauges. The Brown Instrument Company, Philadelphia, Pa. Catalog 6702, 80 pages, illustrated. Gives complete engineering and application data. (9)

Worthington Pump and Machinery Corporation, Harrison, N. J. Bulletins on portable compressors and vertical duplex refrigeration compressors. (10)

Metal Hardening. Leeds and Northrup Company, 4901 Stenton Avenue, Philadelphia, Pa. Bulletin L-960, "The Vapocarb Hump Method for Hardening." (11)

Rubber Chemical Equipment. The Luzerne Rubber Company, Trenton, N. J. Acidproof rubber pumps, valves, pipe fittings, etc. Several bulletins available. (12)

Flexible Couplings. Farrel-Birmingham Company 437 Vulcan Street, Buffalo, N. Y. Bulletin 437 on Gearflex couplings; illustrated; diagrams and tables of engineering data. (13)

General Chemical Company, Schenectady, N. Y.: Portable Instruments, Type AP-9, a bulletin on medium-size voltmeters, ammeters, milliameters and wattmeters. (14)

Bell-Type Furnaces for Nonferrous Annealing. Electrical equipment for annealing such products as coiled wire, tubing, strip, etc. Maker stresses economy, uniform work, good surface finish, rapid operation. Provides means

Save time. Use the coupon below to get any of the above catalogs or bulletins, or for data on any subject not mentioned this month. Metal Industry will see that you get them promptly.

METAL INDUSTRY
116 John Street, New York.

(Insert below the number printed at the end of each item desired.)

I wish to receive the following bulletins mentioned in NOVEMBER: .....

.....

I want information on the following equipment or materials also: .....

.....

of using a gas atmosphere. General Electric Company, Schenectady, N. Y. (Bulletin GEA-1752 covers this equipment.) (16)

Water Heater. Model W-45 "Hotpoint" automatic electric heater for industrial use. Bulletin GEA-1800, illustrated, gives full data. General Electric Company, Schenectady, N. Y. (17)

Forestalling Labor Troubles, by Allen W. Rucker, in collaboration with N. W. Pickering, president, Farrel-Birmingham, Inc., 9 Main Street, Ansonia, Conn. (Free from company mentioned.) No. 4 of a series of pamphlets on various industrial and economic subjects of great interest at this time. (18)

Steel and Metal Catalog. Joseph T. Ryerson and Son, Inc., Chicago, Ill Large, complete stock list with complete data on all kinds of steel, brass, copper and other metals. Good illustrations, tables, etc., are included. (15)

News of Associations

American Electroplaters' Society—New York Branch

With the cooler weather coming along, we are having better attendance at meetings. The last few meetings were very interesting, with discussions of some of the latest plating practices. Several of the members displayed samples of plated work, and started general discussions of the methods used to do such work.

Now that we have discovered who our "Phantom Artist" is, probably some of the members can prevail upon him to exhibit some of his work at the next convention.

Friday night, October 21, a delegation from New York Branch paid an unannounced meeting to Newark Branch. A very interesting talk was given by Dr. Karl Schumpelt, of Baker and Company, on "The Science of Alloy Plating." Dr. Schumpelt did very well in explaining the scientific basis of alloy plating which the practical plater knew but could not explain.

The Newark Branch, through our good friend Horace Smith, tried to apologise for not making arrangements for refreshments, but an apology was unnecessary, as it was not our intention to have a "big time." Our object was to make new friendships and cement old ones. A good time was had by all, both socially and educationally. The New York Branch thanks the Newark Branch for the way in which it was received and for the good fellowship displayed, and extends an invitation for a return visit in the near future.

Arthur Wallace,
Recording Secretary

United Electroplaters League

The United Electroplaters League, organization of electroplaters and plating room help, held an open meeting the evening of October 24, at Teutonia Assembly Rooms, 158 Third Avenue, New York. The meeting was primarily for organization purposes, discussion of certain phases of labor conditions in the plating industry under the N.R.A., and also for technical discussion of plating problems. There were a number of special speakers at the meeting, which was opened by Charles Berlin, chairman of the Organization Committee, and Dennis Kelly, president of the League. John E. Sterling, secretary, also gave some introductory remarks, and welcomed the visitors.

Charles Siegerman, an official of Local 38 of the Silver Workers' Union, an A.F.of L. affiliate, and H. Spoody, president of that local, were present, and addressed the platers and helpers present, who numbered about 100. They stressed the need of labor organization in the plating industry.

Charles H. Proctor was a guest speaker. He read a paper, "Looking Forward in the Electroplating Industry." In introducing his paper he remarked that stainless steel is making enormous headway in eliminating the need of protective coatings on iron and steel. In his paper he stressed the plater's need of continued study and improvement, especially in chemistry and the fundamentals of deposition and analysis, in order to keep his place in the industry.

George B. Hogaboom of Hanson-Van Winkle-Munning Company, another guest, addressed the meeting on the need of continued study and improvement. He pointed out that the League's policy of including helpers in the membership is a progressive step toward successful organization. He said that the helpers in the plating room should not be excluded from it, but should be aided in gaining all possible knowledge of the work, as this would help to consolidate the organization and eliminate the untrained man who might attempt to supplant the plater. He advised the platers to avoid secrecy of any kind, but rather to spread and exchange their knowledge. Mr. Hogaboom also expressed his sympathy with the aim of the League to improve the economic situation of the plating profession.

Other guests at the meeting were Alfred E. Pritchard of Newark; G. Hoffman; Joseph Minges, ex-president of the League.

Regular meetings of the League are held the second and fourth Tuesday of each month at the rooms mentioned above. Headquarters are in care of John E. Sterling, secretary, 2540 Steinway Street, Astoria, Long Island, N. Y.

Copper and Brass Research Association

Frederick Laist, vice-president of the Anaconda Copper Mining Company was elected president of the Copper and Brass Research Association at its thirteenth annual meeting held October 19. Mr. Laist succeeds the late R. L. Agassiz, former chairman of the board of the Calumet and Hecla Consolidated Copper Company.

Vice-presidents elected were: F. S. Chase, president, Chase Brass and Copper Company; C. D. Dallas, president, Revere Copper and Brass Incorporated; H. Donn Keresey, president, Anaconda Wire and Cable Company; Louis S. Cates, president, Phelps Dodge Corporation. C. T. Ulrich, treasurer of Kennecott Copper Corporation, was re-elected treasurer. Among the members of the Executive Committee are the following brass and wire mill men:

F. S. Chase; C. D. Dallas; E. O. Goss, president, Scovill Manufacturing Company; H. Donn Keresey; W. R. Webster, chairman of the board, Bridgeport Brass Company; John A. Coe, president, The American Brass Company.

On the Board of Directors which includes the members of the Executive Committee, is F. J. Bassett, vice-president, Revere Copper and Brass Incorporated, also a mill man.

National Safety Council

Some 5,000 safety delegates met in Chicago early in October at their Twenty-Second Annual Safety Congress and Exposition to formulate plans for the prevention of accidents. An inspirational message from President Roosevelt was read to the Congress, which included special program sessions planned and conducted by more than 25 different cooperative sections of the National Safety Council each representing an entire industry or public safety group. Elections for the coming year in each of these sections, were held, and general officers of the National Safety Council were elected.

British Metals Institute

Following its recent Silver Jubilee celebrations, the Institute of Metals of Great Britain has just issued the program for 1933-34. There will be three general meetings of the Institute—on March 7-8 and in September, at each of which a number of important original metallurgical communications will be presented for discussion, and on May 9 the Annual May Lecture will be delivered.

In addition there will be monthly meetings of local sections. Thus, at Birmingham, papers will be read on "Nickel and Nickel Alloys", "Age Hardening Copper Alloys" and "Rolling Mill Practice", while in addition there will be a symposium on defects in cold working.

Personals

Frank G. Breyer

Frank G. Breyer, who was recently appointed manager of the Lacquer Manufacturers' Association, has had an interesting career in the field of metals and metal compounds.

Mr. Breyer is a partner in the firm of Singmaster & Breyer, 420 Lexington Avenue, New York City. He is a graduate of the public schools of Baltimore and holds the degrees of A.B. and M.A. from Johns Hopkins University. In 1910 he took a position as research chemist with the New Jersey Zinc Company, which he held until 1912, when he was appointed chief chemist. In 1917 he was made chief of research

Photo, Blank-Stoller

FRANK G. BREYER

and development of the zinc company, and remained in that post until 1927, when he left to organize with James A. Singmaster the partnership of Singmaster & Breyer. The expansion of the scientific activities of the New Jersey Zinc Company to a position high among the world's leaders in research and development occurred during the period of Mr. Breyer's services as chief of the research department.

Mr. Breyer is a specialist in the metallurgy of zinc, the manufacture of pigments, paint, rubber and plastics, and the utilization of low grade fuel. He is the patentee or joint patentee of about 50 American patents, many of which are patented in most civilized countries of the world. Among these are the basic patents on light resistant lithopone, under which the entire lithopone industry of the United States and part of Europe is licensed by the New Jersey Zinc Company; the vertical retort method of smelting metallic zinc, now in commercial operation on a large scale in the plants of the New Jersey Zinc Company and the Grasselli Chemical Company. The vertical retort does away with the centuries old fire concentrating method for zinc, which involves the recovery of a few pounds of metallic zinc per day from individual clay retorts, which are hand charged and discharged. It replaces these by a vertical shaft which produces tons of metal per day with no hand labor. He also holds patents covering the mechanization of zinc oxide furnaces and the production of extremely finely divided particles of metal oxides, particularly zinc oxide, by the blast method.

He is the author of a number of papers which he has read before technical and industrial societies, and published in technical and industrial journals. His memberships include the following: American Chemical Society; American Institute of Mining & Metallurgical Engineers; American Electrochemical Society; American Society for Testing Materials; Association of Consulting Chemists & Chemical Engineers; American Institute of Chemists. He is a member of a number of committees of these societies, and is chairman of the Committee on Reduction and Refining of Lead and Zinc of the A.I.M.M.E. Last but not least, chairman of the Committee on Unemployment and Relief for Chemists and Chemical Engineers for the metropolitan area.

Fink Gets Perkin Medal

Dr. Colin G. Fink, Professor of Electrochemistry at Columbia University, New York, has been elected to receive the Perkin Medal of the Society of Chemical Industry for 1934. The medal is awarded annually for valuable work in applied chemistry, and will be presented this year to Dr. Fink for his inventions in the fields of metallurgy and electrochemistry. The selection is made by a committee representative of five of the national chemical societies. Presentation of the medal will be made at a meeting in New York Early in January.

C. A. Baumhauer, formerly president of Phoenix Brass Foundry and Machine Works, Mobile, Ala., has been elected a commissioner of that city.

Edward D. Herrick is now vice-president in charge of sales of Johnson Bronze Company, New Castle, Pa. He was previously chief engineer of the Lycoming Manufacturing Company. **Lee Berthold** has been appointed sales promotion and advertising manager of Johnson Bronze Company. He was formerly general sales manager of Louden Machinery Company.

Pangborn Corporation, Hagerstown, Md., announces the appointment of **Fred E. Wolf** as the sales engineer for the New England territory, with office at 19 Orchard Terrace, Arlington, Boston, Mass. Mr. Wolf has had 18 years of engineering and sales experience with the company, and has been manager of the Pittsburgh office for more than ten years, giving service in all branches of sand blasting and dust collecting work.

S. B. Taylor of East Orange, N. J., has been appointed an industrial advisor to the National Recovery Administration. He will represent the anti-friction bearing industry.

James G. Vail of the Philadelphia Quartz Company, Philadelphia, Pa., has been awarded the Chemical Industry Medal by the Society of Chemical Industry, for his work on sodium silicates. The medal is a new award and will take the place of the Grasselli Medal which had been given for some years and has now been discontinued. Mr. Vail is the first recipient of the new award. It was presented November 3, at a joint meeting of the Society of Chemical Industry, the American Chemical Society and the Electrochemical Society.

John C. Oberender

On November 30, John C. Oberender, New England sales manager for The Zapon Company, Stamford, Conn., will celebrate, with Mrs. Oberender, the thirtieth anniversary of their wedding. The auspicious occasion will bring forth congratulations from many people in all parts of the United States, for John Oberender is one of the most popular men in the metal finishing supply industry. Mrs. Oberender is also well known to both the plating and finishing and the supply industries, having accompanied him to a great many of the

JOHN C. OBERENDER

annual meetings and conventions at which John has been a familiar figure for years.

John Oberender started his career as a metal finisher with Eberhard Faber Pencil Company, Brooklyn, N. Y., many years ago. Later he was with the American Hardware Company, becoming lacquer department foreman and, later head of the plating and finishing departments. He went into the supply field with Zapon in 1918, first taking charge of Western Connecticut sales. He went to Chicago in 1921 to be assistant manager for Zapon there. In 1923 he became New England sales manager.

Obituaries

William T. Timmons

William T. Timmons, president of the Electroplaters and Stereotypers Association of New York, the man who developed the nickel-faced electrotype process, died September 23, 1933, at his home in Montclair, N. J. He was 54 years old.

In 1911, having developed the nickel-faced electrotype, Mr. Timmons formed the Lead Mould Electrotype Foundry, New York, and was president of that concern until last April, when it merged with the Flower Steel Electrotype Company, New York.

Mr. Timmons learned electrotyping as an apprentice with Hanson and Son, Philadelphia, forty years ago. As a journeyman he worked for a number of concerns there and in New York. He was electrotype foreman for the Trow Company, New York for some time. When he developed the nickel solutions for use on electrotypes he installed them in many large plants, including that of the Government Printing Office at Washington. He also operated plants in Rochester and Cincinnati before establishing the Lead Mould firm.

Frank A. Wallace

Frank A. Wallace, president of R. Wallace and Sons, Wallingford, Conn., silverware manufacturers, died on October 14, 1933, aged 77. Mr. Wallace was the son of Robert Wallace, who founded the firm.

Mr. Wallace was born in 1857 at Wallingford, Conn. His father Robert Wallace was one of the most progressive and prominent manufacturers of his day, a man whose originality and persistent application left a marked influence on the history of American industry. He was a pioneer manufacturer of German silver in America, and started the largest concern devoted to the manufacture of flat silverware in the world. At eighteen Robert Wallace manufactured spoons in an old gristmill shop in Chesire. He was destined to link his name with a new epoch in the manufacture of metal goods in the United States. He had been at work a short time in the old mill when he was shown a spoon made of a metal new to him, called German silver. A chemist, Dr. Louis Feuchtwanger, was known to have brought a small bar of the metal from Germany. This bar Mr. Wallace purchased, and had it rolled into spoons. Later he found a gentleman who had brought the formula for the metal, and who sold it to him for twenty-five dollars. In his factory, Mr. Wallace compounded the first German silver made in America, and to him is due the honor of being the pioneer in this new industry. At this time he began to manufacture spoons and flatware on a more extended scale. In 1865 the firm's capital assets were about $100,000 and the style of the corporation became Wallace, Simpson and Company. The manufacturing capacity was more than correspondingly increased. In 1871, Mr. Wallace bought out Mr. Simpson and with two of his sons formed R. Wallace and Sons Manufacturing Company. Robert Wallace died in 1892.

Frank A. Wallace, who succeeded him, had entered the firm in 1873.

With a strict application to his duty and with a determination to win the utmost success as a silversmith, Frank Wallace had climbed the ladder until he was elected president of an industry that has salesrooms in New York, Chicago, San Francisco and Philadelphia. He had been workman, director, superintendent, secretary and, from 1892 was president.

FRANK A. WALLACE

William T. Elkinton

William T. Elkinton, chairman of the board of the Philadelphia Quartz Company, Philadelphia, Pa., died October 25, 1933 aged 73. Through more than 50 years of active business life, which saw his company expand from a local enterprise to a business of national scope, Mr. Elkinton consistently remembered his religious and philanthropic responsibilities. Naturally modest and retiring, he was known by his patient steadfast character. He is survived by his wife, Eleanor Rhoads Elkinton; and two children, Thomas W. Elkinton, president of Philadelphia Quartz Company, and Mrs. Anna Evans.

John Stewart Murray

John Stewart Murray, director of purchases of the Aluminum Company of America, Pittsburgh, Pa., died suddenly on October 16, 1933, aged 57. Mr. Murray had been with the Aluminum Company for many years.

Industrial Materials Exhibit at New York

Something new in commercial shows was held the week of October 23 at the Park Central Hotel, New York City. This was the Industrial Materials Exhibit, sponsored by a number of noncompeting manufacturers of various raw, semi-finished and finished products. Visitors were specially invited by the sponsoring firms, and the show was open afternoons and evenings. The evening sessions were something of an innovation in commercial exhibits, being a combination of dance, floor show with professional entertainers, and the products exhibit. The sponsors included the following companies:

American Hard Rubber Company; Bakelite Corporation; Bridgeport Brass Company; Carborundum Company; Peter A. Frasse Company; Irvington Varnish and Insulation Company; R. A. Keasbey Company; Maas and Waldstein Company; Mount Vernon Die Casting Company; Spaulding Fibre Company; Texas Company; Waterbury Button Company.

National Business Show

The 30th annual National Business Show took place in New York City the week of October 16. It was a fine display of the latest products in the office and store equipment field, worthy of its alternate name, "America's Efficiency Exposition."

Of interest to the metal and finishing industries were the large number of metal products shown, and the great variety of finishes used. Metals of many kinds and in every conceivable shape and form are employed in making equipment ranging from office pins to type casting machinery, with such things as duplicators, check writers and signers, typewriters, filing machinery and equipment scales, and a host of other products, in between. The materials used include all the common ferrous and nonferrous metals and alloys, in the forms of castings, stampings, sheet, strip, rod, tubing, die castings, die pressings, forgings, wire, foil, etc. The finishes on display included practically every kind of electroplate, with chromium much in evidence, as well as lacquers, enamels, japans, paints and lustreously polished bare metals.

As for business, there seemed to be an air of pretty lively activity, and it was reported that the factories in this field, notably the typewriter and business machine plants, are operating on fair schedules, with good payrolls.

Chemical Exposition

The Fourteenth Exposition of Chemical Industries will be held at Grand Central Palace, New York City, during the week beginning December 4.

The exposition will be characterized throughout by its revelation of fields in terms of their three broad industrial classifications; materials, machinery, and products.

Industrial and Financial News

Codes Submitted Under N. R. A.

Silverware Manufacturers' Institute last month submitted its code of fair competition to the National Recovery Administration at Washington, D. C. This Institute is said to represent the following divisions: plated flatware; plated hollow ware; plated toiletware and novelties; flat and hollow hotel-ware; pewter, chromium plate and miscellaneous; sterling flatware; sterling hollow ware, sterling toiletware; sterling novelties. The code in general follows the principles of the President's blanket code. Working hours are stipulated in it as follows: maximum of 40 hours per week for all employees except in seasonal peak production period when the maximum will be 48 hours a week, while six-month weekly average shall not exceed 40 hours weekly for any employee; hub and die cutters are not included in the above, are to work maximum of 48 hours a week, and their number is not to exceed 5% of total number of a plant's employees. Watchmen, engineers, executives, outside salesmen and certain others receiving over $35 a week are not included in the above categories. Proprietors performing same work as employees are restricted to the same hours as employees. Minimum wages are 35c per hour for any work; learners (not to exceed 5% of total number employed) can be paid 80% of minimum; physically handicapped workers (not to exceed 2% of total) are exempt from minimums.

National Screen Institute, claiming to represent 80% of metal insect screen industry, has filed a code which fixes minimum wage of 40 cents per hour for unskilled labor and $15 per week for clerical employees in cities of over 500,000 population, scaled down to $12 per week in towns of less than 2,500 population; basic maximum work week of 40 hours averaged over six months, not more than 48 hours in any one week nor more than 8 hours in any one day.

Anti-Friction Bearing Manufacturers Association, claiming to represent 99% of that industry, has filed a code which proposes for factory employees, mechanical workers and artisans maximum of 40 hours a week, with a tolerance up to 48 hours per week during not more than six weeks in a 6-months' period to meet peak demand, with time and a half for all overtime work. These hours do not apply to executive, supervisory and other classes of employees usually excepted in codes. A minimum wage of 40 cents an hour is proposed, except for light repetitive work and such other light factory work as does not usually require the strength and skill of adult male labor, for which a minimum of 30 cents is fixed. For office workers the minimum ranges from $15 a week in cities of more than 500,000 population to $14 per week in cities and towns less than 250,000.

Copper and Brass Warehouse Distributors' Association will submit a code of fair competition for the industry, prepared at a four-day meeting in Chicago, at which the following were elected officers of the Association, which is said to represent 85% of the nonferrous United States warehouse business:

J. J. Whitehead, Whitehead Metal Products Company, New York, president; Albert Duce, Steel Sales Corporation, Chicago, first vice-president; William M. Orr, William M. Orr and Company, Pittsburgh, second vice-president; E. C. Ducommun, E. C. Ducommun Company, Los Angeles, third vice-president; C. H. Krueger, Chase Brass and Copper Company, New York, treasurer; H. S. Morse, Scovell, Wellington and Company, New York, secretary.

Directors of the organization, in addition to the officers named, include: J. R. Foss, of M. J. Foss, Inc., Denver; E. C. Edmundson, Williams and Company, Cleveland; W. B. Brown, C. T. Conklin Company, New York; E. G. Atkinson, Seaboard Brass and Copper Company, Baltimore; R. E. Grote, Metal Goods Corporation, St. Louis; J. Stelwagon, Stelwagon Manufacturing Company, Philadelphia, and John Nation, J. M. Tull Rubber and Supply Company, Atlanta.

Buff and Polishing Wheel Manufacturers' Association, claiming to represent 85% of the industry, has filed a code which fixes a maximum work week of 40 hours for plant workers, and fixes minimum wages at 32½ cents an hour. There are certain modifications relative to learners, watchmen, clerical help.

A code has been submitted by the **Buffing and Polishing Composition Manufacturers' Association,** composed of 12 of the 32 known firms in the industry, but claiming to represent 90% of the value of the industry's output. Under it employees in the industry would work a maximum of 40 hours a week and receive a minimum of 32½ cents an hour.

Grinding Wheel Manufacturers' Association, representing 85% of the industry, has filed a code which fixes a maximum week for factory workers, 40 hours; time and a third for overtime, for which certain provisions are included. The code also proposes minimum wages of 36 cents an hour for male employees and 30 cents an hour for females.

Codes Approved

The President has approved Codes of Fair Competition for The Plumbago Crucible Industry and for The Industrial Supplies and Distributors Trade.

General Hugh S. Johnson, N.R.A. Administrator, said the plumbago crucible industry is contributing to reemployment by putting back to work approximately 28% of those employed on February 16, 1932, through reduction of normal hours from 48 to 40. One provision of this code under trade practices eliminates the sale of second quality crucible. This prevents danger to operatives using crucibles, it is stated. The crucible accessories and refractories containing plumbago or graphite are sold for use in melting metals. Sales of the industry the first half of 1933 were about a third of those in 1929.

Combined N. R. A. Meeting in Washington of the Buffing and Polishing Composition Industry and the Buff and Polishing Wheel Industry Which Held Their Hearing October 18.

Business Items---Verified

Michigan Aero Engine Corporation, 704 East Kalamazoo Street, Lansing, Mich., has changed its name to **Lundberg Screw Products Company.** Capital structure has been decreased from 10,000 no par common shares to 100 shares.

Lenon Corporation, formerly at Detroit, Mich., has changed its name to **Brannon Appliance Corporation,** and has moved plant and offices to 627 South Dearborn Street, Howell, Mich. Company makes electrical appliances, and operates an aluminum foundry, tool room and stamping, polishing and grinding departments.

T. Shriver and Company, Harrison, N. J., makers of filter presses used in clarification of plating solutions, has appointed **The Merrill Co.,** engineers, 343 Sansome St., San Francisco, Calif., as sales agents for Rocky Mountain and Pacific Coast areas.

Reynolds Metals Company, Louisville, Ky., has acquired the manufacturing rights to produce lath building fabrics known as "Ecod," from the **D. Coddington Manufacturing Company,** of Milwaukee, Wis.

American Cyanamid and Chemical Corporation, New York, has opened an office in the New Center Building, Detroit, Mich.; telephone, Trinity 2-1330. **George S. Horsfull,** resident representative of the company, will be in charge of the new office.

Heileman and Roth, manufacturing jewelers, have consolidated with **The Jewelers Service Company,** and continues operation as Heileman and Roth at Richards Building, 415 Race Street, Cincinnati, Ohio. **E. W. Tschan,** formerly owner of Jewelers Service, is now general superintendent of the combined organization. **Charles J. Heileman,** its president, founded his company in 1919. It is now one of the largest jewelry manufacturers in the middle west, with complete facilities for all branches of its work, including manufacture of gold articles and fraternal insignia; special order work; general repairing; designing; lapidary work; diamond cutting and setting; platinum-smithing; engraving; crystal grinding; enameling; casting; plating; polishing; etc.

More than 1,000 employees returned to work at the plant of the **Girard Model Works,** Girard, Pa., on October 17, wood and metal toy manufacturer following an announcement by officials that a wage increase of 10% had been put into effect. The workers had walked out on a strike when their demands for higher wages were refused.

Apex Electrical Manufacturing Company, Cleveland, O., manufacturer of electrical household appliances is operating its plants at capacity, with demand for cleaners, washing and ironing machines running ahead of production, reports R. J. Strittmatter, vice-president. Refrigerator volume is beginning to reflect the usual seasonal decline after an extraordinary volume of Summer sales.

Atlas Bronze Corporation is now operating the brass and aluminum foundry formerly conducted by **Harry E. Mousley** at 2409-17 Cedar Street, Philadelphia, Pa. **A. S. Gardner,** president of the company, was formerly vice-president and general manager of **Paul S. Reeve,** Philadelphia; Mr Mousley, who is secretary-treasurer, was formerly with **Ajax Metal Company.** Both have had considerable foundry experience.

H. H. Harold, Wooster, O., operating a machine shop and foundry, plans removal of plant to New Philadelphia, O., where he has acquired larger facilities.

Segal Lock and Hardware Company, Norwalk, Conn., has a contract to furnish finishing hardware for 1,595 apartments in the Knickerbocker Village slum eradication development recently started in New York's lower East Side with R.F.C. loans. Contract calls for over 130,000 pieces of hardware.

International Selling Corporation, 70 Pine Street, New York City, announces the resignation of Mr. M. Blanc as president. At a recent board meeting the following officers were elected: President, P. D. Level; vice-president and treasurer, E. A. Darling; vice-president, W. E. Miller; assistant treasurer, C. Bauer; secretary, J. C. Allain-Launay.

Corporation Reports

Aluminum Industries, Inc., St. Cloud, Minn.: for 8 months ended Aug. 31, 1933, net profit, $101,526, compared with net loss of $48,017 in same 1932 period.

Bohn Aluminum and Brass Corporation, Detroit, Mich.: for 9 months ended September 31, 1933, net profit, $1,159,229, compared with net loss of $73,693 in same 1932 period. Dividend of 50 cents a share was voted for fourth quarter this year, compared with 25 cents paid hitherto.

American Smelting and Refining Company, New York: for first six months of 1933, net earnings, $2,030,209, compared with loss of $3,442,047 in same 1932 period.

Canadian Metal Products

Production from the miscellaneous non-ferrous metal products industry of Canada was valued at $490,076 in 1932 as compared with $480,188 in 1931. Products include weatherstripping, lamps, spray painting equipment, atomizers and sprays, gasoline lamps and generators, mantles, window screens, storm sash, and similar commodities which could not be classified otherwise.

Massachusetts Foundries Increase Employment

Employment in Massachusetts foundries showed a sharp pick-up according to the figures of the Massachusetts Department of Labor and Industries whose September survey, including reports from 62 Bay State foundries, found the number of wage earners up 10% and the actual amount of payroll up 11½%. An even better showing was made by 21 electrical machinery manufacturers, including radio builders, who reported a pick-up of 12.7% in number of wage earners and an increase of 15.1% in the total amount of payroll. In both cases there was a slight gain in the average weekly earnings.

Nineteen producers of metal alloys including metal stampings increased payroll from an average of $24,900 weekly in August to $26,200 in September.

American Tube Works

Walter E. O'Hara of Fall River, Mass., and associates have acquired a controlling interest in the American Tube Works of Somerville, Mass., one of the largest manufacturers of copper pipes and tubes in the country. (A description and history of the company appeared in METAL INDUSTRY, January, 1931.)

Mr. O'Hara has been elected president and treasurer, succeeding, respectively, Walter B. Grant and John J. Dervan. Jerome A. Newman of New York City is now chairman of the board and will supervise the sales department.

American Tube Works has $865,000 in preferred stock and $300,000 in common. The consideration in the purchase was not disclosed.

Copper Wire Nails

Simplified Practice Recommendation RI50-33, Copper Wire Nails, has been accorded the required degree of written approval by the industry, and is to become effective December 1, 1933, according to an announcement by the Division of Simplified Practice, Bureau of Standards, Washington, D. C.

The recommendation, which was proposed and developed by the industry, covers the length and gauge of common copper wire nails with flat heads, and copper wire slating nails. The recommendation represents a substantial reduction in the variety heretofore listed for regular stock purposes.

Morris Lewschin Sought

Information is wanted by 67 West 47th Street, New York City, of Morris Lewschin, 30 years of age; 5 ft. 11 in. tall; weight 180 pounds; dark curly hair; brown eyes; a metal salesman by occupation; a native of Russia, whence he arrived in this country in 1920; who has not supported his wife and small son since July, 1929, as a result of which they are in great need, and dependent on the bounty of others.

News From Metal Industry Correspondents

New England States

Waterbury, Connecticut

November 1, 1933.

There has been a slight recession in business in all the local factories during the past month, in contrast to the unusual and steadily increasing upturn during July, August and most of September. It is reported that most of the factories have laid off a few men, but not nearly so many as were hired back during previous months. The recession seemed coincident with the drop in the price of copper, and is reported to be due indirectly to that. Many concerns that had placed orders with local firms are reported to have sent in cancellations due to the drop in the price of copper, expecting that it would be followed by a drop in the price of brass. However, it is apparent that the local firms do not expect the copper drop or the slight business recession to amount to much, as they have not reduced the price of brass at all.

Scovill Manufacturing Company has erected a large addition to the branch factory of its subsidiary, **A. Schrader Sons, Inc.**, in Birmingham, England. The addition covers about 40,000 square feet and is being utilized for complete manufacturing operations of the Schrader products for British countries. Heretofore the tire valves and similar products were merely assembled abroad.

Edward O. Goss, president of Scovill, **John H. Goss**, its vice-president, **John A. Coe**, president of American Brass, and Harold Coe, R. F. Wildman and F. C. Weaver of that company were in Washington last month conferring with Deputy Administrator King and putting the finishing touches on the copper and brass mill products code.

It is understood that the manufacture of bus bars, copper and copper alloy wires for insect screens, brake linings and abrasive wires will be included in the code, although for some time various manufacturers urged that they be put in another code, such, for instance, as the electrical code. It is also understood that the so-called merit clause, insisted upon by many manufacturers, has been dropped. Ultimately the code is expected to include a provision authorizing representatives of the administration to have places on the governing body of the industry that will administer the code. Most of the manufacturers have objected to the inclusion of such a provision, but Deputy King, it is expected will recommend it.

Several of the local manufacturers are also understood to have been influential last month in drafting the code of the fabricated metal industry. This is defined in the code as the "manufacture of products in whole or substantial part of metal which are beyond the point of finished mill shapes or foundry operations, and which may, for practical administration of the NRA, be too varied and general to be defined and classified specifically in a separate code, but which can be classified as sub-divisions of this particular industry as provided herein."

Representatives of French and English brass concerns were here last month and were reported negotiating with Scovill for rights to a machine developed by Scovill for extrusion of tubes. Scovill officials are vague about the existence of such a machine, but members of other concerns say they understand the company has been working on one for a long time. Many wild rumors have been spread by the employees of the company relative to the subject. One of them is that either a machine or a process has been developed whereby sheet brass as well as tubes, wire and rods can be cast direct without going through the various steps of rolling, annealing, drawing, trimming, pressing, etc., or at least that several of these steps are eliminated.

The Waterbury local of the **International Jewelry Workers' Union** has sent a complaint to the national arbitration board against the **Waterbury Clock Company**, charging undue pressure has been exerted to make employees join the alleged "company union" at the shop. Company officials still contend that the organization in question is not a "company union" as no officials of the company are represented among its officers. The International union holds it is a company union because the company sponsored it and sent letters to the employees recommending that they join it rather than the Jewelry Workers' union. In the complaint the union contends that women are hired in preference to men because they may be paid lower wages, and that the company examines all applicants for work to find out how they stand with regard to joining unions affiliated with the A. F. of L. **Charles H. Granger**, vice-president of the company, denies these charges, and says the company does not seek to influence any employee on the question of union affiliation. He says the company records will show that the numerical ratio between men and women does not vary greatly.

Plans are afoot to reorganize **Beardsley and Wolcott Manufacturing Company**, it was said at the court hearing last month. Receiver **James R. Sheldon** was granted permission to continue operation of the business for another four month period. The receiver has operated the concern at a monthly profit of $2,000 for the past four months, it was said, and the company has $26,000 worth of orders on hand, with more coming in each day. The judge allowed a $54,946 tax claim of the city against the company, due when the receiver was appointed.

W. R. B.

Connecticut Notes

November 1, 1933.

HARTFORD—Testimony was heard in federal court here last month in the patent infringement suit brought by United Chromium, Inc., against **General Motors, New Departure Company** of Bristol, the **Bassick Company** of Bridgeport. General Motors is accused of using chromium and infringing the Fink patent in its New Departure plant in Bristol. The same is charged against Bassick.

Arrow-Hart and Hegeman Electric Company paid a quarterly dividend of 10 cents a share on the common and $1.62½ on the preferred Oct. 2.

Standard Screw Company paid its regular quarterly dividend of 50 cents a share in October.

Underwood Elliot Fisher Company had a net profit of $539,954 for the September quarter. The net for the previous quarter was 18 cents a share, and in the September quarter last year there was a net loss of $305,812.

Royal Typewriter Company is making a survey through the country to determine the condition of the business machine equipment of business firms. President E. C. Faustman says firms are replacing equipment, and by the end of the year he expects 25% will have been replaced.

NEW BRITAIN—A special train was chartered to carry the local hardware manufacturers from this city to the convention of the American Hardware Manufacturers' Association in Chicago last month.

Hart and Cooley Company paid the regular quarterly dividend of $1.62½ a share on Oct. 2. **Logan E. Page**, secretary and director of **Tuttle & Bailey, Inc.**, a subsidiary of Hart and Cooley, has resigned to become supervisor of sales for the **Carpenter Metal Products Company** in territory east of Buffalo.

BRIDGEPORT—Thirty factories in this city reported 12,140 persons employed during the week ended Sept. 30, an increase of 3,270 since April 22. Total man hours was 462,206, the highest since October 1931, and the average per man was 36.5. There was an increase of 270 persons employed during the week alone.

MERIDEN—Payrolls of 28 factories here are now running to about $85,000 weekly, an increase of $15,000 weekly

over July. About 1,100 employees were added during August and about 1,500 during September.

Miller Brothers Holding Company has been organized by interests identified with **Miller Brothers,** manufacturers of household articles, in receivership since 1926, and will take over the property from the mortgage bondholders.

WINSTED—Strand Enamel, Inc., is now producing enamel and enamel wire for the trade. A modern plant is being erected and will be ready by spring. About 50 persons are now employed, but the number will be tripled when the building is completed. W. R. B.

Providence, Rhode Island

November 1, 1933.

The State Commissioner of Labor reports that the 219 Rhode Island manufacturing concerns which reported had a slightly larger number of employees on their pay rolls September 30 than August 31. Actual number at end of September was 64,979, compared with 64,773 a month earlier, and 64,587 during the last week in July. The local report for the final week of last month showed increases over August in every industry except cotton manufacturing. The metal trades, representing 30 establishments, reported a 4.9% increase. Jewelry manufacturing, picking up seasonally, showed an 8.3% increase in working force. Thirty-six building construction companies expanded their working forces 36.9% last month; other construction enterprises decreased employment 15%.

Association of Gold and Silver Refiners has been formed to promote the interests of the group and to co-operate with the **Council of Jewelry Manufacturers and Allied Trades.**

George Briggs of the **Screw Machine Products Company** has been elected vice-president of the **National Screw Machine Products Association,** which has been organized by manufacturers of products which can be made on single or multiple automatic or hand screw machine equipment. At the organization meeting 146 manufacturers were represented.

The Electro-Platers' Association of Providence and the Attleboros, at a meeting held at the Narragansett Hotel here, voted unanimously to join with the **Council of Jewelry and Allied Industries** in support of the code that has been filed in Washington, and which has been tentatively approved by the recovery administration. **Walter Dolbra** of Attleboro, chairman of the association, presided. The code provides for a 40-hour week, with certain provisions by which manufacturers can extend the hours during periods when seasonal increase in business occur. Unskilled workers will receive a minimum of 32½ cents an hour and skilled workers a minimum of 40 cents an hour. Between 300 and 500 electroplaters here and in Attleboro, are affected.

Majestic Ring Company, Inc., has changed its name to **Peerless Ring Company, Inc.**

Alfred Vester Sons, 5 Mason street, Providence, is owned and conducted by **Solomon Kipnis** and **Samuel Kipnis,** 7123 Nineteenth Avenue, Brooklyn, N. Y.

Artcrafts Manufacturing Company, 226 Eddy Street, Providence, is conducted by **Arthur Lawton,** 54 Metropolitan avenue, Cranston, R. I.

Ernest De Robbie, 20 Penn Street, **Morris D. Newman** and **Carl A. De Robbie,** all of Providence, have incorporated the **D & S Company, Inc.,** to manufacture jewelry; authorized capital, $5,000.

Strauss Company, Inc., has incorporated here to conduct a sheet metal contracting business.

Articles of association have been filed by **Providence Manufacturing Company,** to manufacture, buy and sell metal, jewelry and precious stones.

Metal Findings Manufacturers' Association met October 4 for one of its best sessions in a long time. **Frederick A. Ballou Jr.,** presided. Most of the afternoon was given over to discussion of the NRA code of fair practices formulated by the Council of Jewelry Manufacturers and Allied Trades. The items as submitted had been before the code committee of the association, and were approved almost as submitted. Two items received special attention, prohibitions of the giving of samples and of long term contracts. The final vote on the former was approval with the reservation that findings manufacturers be allowed to give samples up to 25 cents in value. The section on long term contracts with resultant reduction in prices provoked long discussion, some believing it necessary to conform to buyers rules in bidding for contract jobs.

W. H. M.

Western Massachussets

November 1, 1933.

Business in 26 metal working concerns, with few exceptions, displayed considerable improvement last month, and gives promise of showing an even greater upturn during the coming month.

Both the East Springfield and Chicopee Falls plants of the **Westinghouse Electric and Manufacturing Company** were closed most of the month as the workers sought improvement of their working conditions and an increase in wages, but early settlement of differences was expected, and with orders mounting it appears that when operations are resumed the plants will be running with heavy forces.

Conditions at the **United American Bosch** have been showing decided improvement for some time, and increased orders indicate that next month there will be even greater activity.

Perkins Gear Company, which had but a handful of workers in the plant early in the year, has increased its working force by hundreds. It is reported that an increase in orders at the plant is expected within the month.

Baush Machine Tool Company, although involved in litigation, has experienced no decrease in business, and within the next few months it is expected there will be a great improvement in business.

Van Norman Machine Tool Company: conditions are much improved, and according to word from plant officials an early pickup in orders is anticipated. The same is the report from the **Cheney-Bigelow Wire Works.**

Last month receivers were appointed for the **Westfield Manufacturing Company,** and with the resumption of bicycle buying, it is believed that within the next few months there will be a great spurt in the operations of the company in preparation for the spring demand which shows promise, according to men conducting the affairs of the company at present, of being greatly increased.

The **Westfield Specialties** plant is operating at undiminished capacity, and with increases in business among manufacturers in this section it is believed that orders for this concern will be even greater in the coming months.

G. B. Y.

Middle Atlantic States

Central New York

November 1, 1933.

Spotty gains in employment and business were reported in the Central New York area during the past month.

Concerns handling copper products were the most optimistic.

Rome Brass and Copper Company was reported to have received a number of substantial orders for which it was buying new machinery. At the **Powell Muffler Company** plant in Utica picketing was in progress during the past few weeks as employees claimed they had been locked out because they joined the union, while the management said the plant was temporarily closed in some departments and that the men had not been locked out.

Employment figures for Ilion showed a substantial rise during the month; added work in some of the departments of the **Remington-Rand** was responsible.

Utica Drop Forge and Tool Company will shortly take over the manufacture of the Smith armor cutter, now being made in Oakland, Calif., and used in cutting copper cable in wiring work. The Utica concern plans to put on 10 more men.

Business of the **Savage Arms Corporation** in Utica has increased recently, and the company is now operating profitably. E. K. B.

Trenton, New Jersey

November 1, 1933.

Metal plants in Trenton have shown an upward trend during the past month.

John A. Roebling's Sons Company has placed more men at work in different departments.

Trenton Brass and Machine Company is also operating normally.

Solfo Chemical Company has let a contract for alterations and renovations to its plant on Pennington Avenue. An addition to the main plant was recently completed.

Abe J. Sloin of Trenton has been awarded a patent for a cable connection for battery cables. The device is a quick connection for securely holding the end of a battery cable in fastening it to a storage battery.

Calco Chemical Company, Bound Brook, has let a contract for a three-story addition to cost $100,000.

Columbia Textile Engraving Company, East Orange, has been incorporated here with $100,000 capital, to manufacture engraving apparatus.

Trubeck Laboratories, East Rutherford, has been incorporated with $125,000 capital, to manufacture chemicals.

C. A. L.

Newark, New Jersey

November 1, 1933.

Receivers have been appointed to look after the affairs of two Newark metal industries. Vice-Chancellor Backes has appointed **Ralph H. Jacobson** receiver for the **Continental Products Company, Inc.,** sheet metal specialties makers, of Edison Street. The court acted upon application of creditors and directors of the concern, who charged dissension among officials. They said the company has been operating at a loss.

Barney Larkey has been made receiver for the **Walton Manufacturing Company,** which formerly manufactured humidifying equipment at 85 Chestnut Street. Creditors and stockholders have been ordered to show cause why the receivership should not be continued. It was charged that the company suspended operations August 1. Assets were said to be rights in certain inventions, and liabilities were set at about $15,000.

A voluntary petition in bankruptcy has been filed in behalf of the **American Type Founders Company** in the United States District Court. The court named **George R. Beach** of Jersey City a referee in bankruptcy. No schedules were filed with the petition, but these will be turned over to Mr. Beach. The petition stated the board of directors had voted for the action because of debts it is unable to pay.

C. A. L.

New Incorporation

General Brass Foundry Corporation, 1346 West Randolph Street, Chicago, Ill.; to manufacture metal castings; by Frank A. Kasper, John Volk and Peter Straka.

Middle Western States

Detroit, Michigan

Production in the metal lines has started to taper off. This is nothing unusual at this season, and was generally expected. There is, however, one noticeable exception—the manufacture of refrigeration units. This industry has continued to progress with little interruption for many months.

The motor car industry has about run its course for the season. Now every one is planning for the new models which, according to reports, will show some radical changes. It is believed that competition in motor cars will be more pitiless than ever, in spite of the fact that there will be some regulations under the NRA code.

Automobile parts manufacturers are slowing up, of course, and they likewise are turning their attention in the direction of future requirements. Considerable delay is expected in tooling up for new models, owing to strikes. These, however, are gradually petering out, but the handicap will be quite far reaching.

No particular improvement has developed in the production of plumbing and heating supplies.

R. I. Petrie has been appointed sales manager for the **Kelvinator Corporation.**

A. C. Flood, who has been acting as trustee for assets of **Copeland Products, Inc.,** manufacturers of refrigeration units, has been named receiver for the proceeds of the recent sale. The Mt. Clemens plant recently was sold by creditors to **Winslow, Baker and Meyering,** Detroit.

Chrysler announced that a plan of employee representation concerning wages and working conditions throughout the organization has been accepted by 83% of the 33,000 employees. Under this arrangement the employees will have an equal voice in deciding all matters affecting their welfare.

According to the **Lansing Chamber of Commerce,** employment in that city reached a new peak during September.

Another wage increase has been announced by the **Motor Wheel Corporation,** Lansing, this being a compromise, it is stated, with the workers who demanded a return to 1929 wage levels.

A wage increase of 10 per cent for all employees of the **Dow Chemical Company,** Midland, reestablishment of the 39 hour week for regular day employees, and continuance of the 42-hour weekly shift for operators, has been announced.

Installation of a huge "Zeppelin" type of electric hydrogen welding furnace in the plant of the **Bundy Tubing Company,** Detroit, is attracting considerable attention. It makes this new kind of welding available to companies whose requirements would not warrant the larger investment represented in such a furnace, it is stated.

F. J. H.

Toledo, Ohio

November 1, 1933.

Industrial conditions in the Toledo area were quite favorable until the last two weeks or so. Then, like other centers along the Great Lakes, a seasonal decline began to show itself.

It looks now as if manufacturing in the metal and the plating industries would not show any great progress until after the first of the year. This does not sound particularly encouraging, nevertheless, it is the usual trend of things at this season of the year.

With the tapering off of motor car production, manufacture of accessories and parts has also declined. The same condition extends into the plating industry, although perhaps not quite so pronounced in Toledo as in other Great Lakes areas, because Toledo has many other manufacturing plants with plating departments that are not depending on the motor car for existence.

The Toledo industrial situation, although it shows the seasonal trend, is considerably better than it was a year ago. Working capital still is none too plentiful, and collections, while improving, could be much better.

F. J. H.

Chicago, Illinois

November 1, 1933.

Decision to continue the **Century of Progress Exposition** until November 12 is good news not only to Chicago Hotels and retail establishments but to the large number of manufacturers throughout the country, whose exhibits at the Fair have resulted directly in millions of dollars in sales and future orders.

Hurley Machine Company reports current shipments of washing machines are more than doubled those of a year ago, with 18 hours per day of operation.

September washing machine sales in general, according to **J. R. Bohnen,** secretary, **American Washing Machine Manufacturers' Association,** reached an all-time record.

Altoffer Brothers Company, Peoria, manufacturers of washers and ironers, reports substantial sales.

The increased winter program of **International Harvester Company** means the employment of 4,000 additional workers between November 1 and April 1, 1934.

F. H. Leggett has been elected treasurer of **Western Electric Company,** to succeed **F. L. Gillman** who retired October 31.

Zenith Radio Corporation is enjoying large sales throughout its export territory.

Edward N. Hurley, Hurley Machine Company, has been appointed by Secretary Roper as chairman of the committee on foreign service of the business

advertising and planning council for the Department of Commerce.

Elgin Machine Works, Elgin, has begun a $20,000 addition to its plant. Equipment costing about $10,000 will be installed.

Williams Oil-O-Matic Heating Corporation, Bloomington, by cooperation with the NRA, has increased its factory force 58%. Most of the shop departments are operating on a two-shift basis, with three shifts required in some shops. Sales are increasing materially.

Charles Piez, 67, retired head of the **Link Belt Company,** and wartime vice-president and general manager of the Emergency Fleet Corporation, died of pneumonia in Washington on October 2. He was a former president of the American Society of Mechanical Engineers.

For the fourth consecutive month the **Grisby-Grunow Company** has scored an increase in sales of Majestic radios. September also proved the best month since 1931.

Among new incorporations here are the following:

Uptown Tool Works, Inc., 1800 Foster Avenue; welding and plating, brass, metal, and bakelite.

Autocontrol Corporation; to manufacture automobiles, motorcycles, airplanes and motor vehicles.

Dijon Air Conditioning Corporation.

Superior Fastener Corporation, 4405 Northwest Highway, machines, tools, metal novelties. R. G. K.

"robots", in its planes according to **P. G. Johnson,** head of the company making the device.

Packard Motor Company had a display here recently of extreme precision equipment used at its plants. **W. H. Graves,** the company's chief metallurgist, was one of the men in charge of the exhibit.

Boyle Manufacturing Company, 5100 Santa Clara Avenue, is celebrating its 38 anniversary. Company makes sheet metal products, and recently has added over 100 items to its line. It employs 300, a gain of 25% over a short time ago.

Airplane Development Corporation, Glendale, will manufacture a new large all-metal, low wing cabin monoplane designed by **Gerard Vultee.** Company is backed by **E. L. Cord** of Detroit.

General Electric Company's plant at Ontario, Calif., announced that in future all their electric irons will be made there. **W. H. Tangeman** is superintendent, and **E. H. Richardson** plant manager.

General Cable Corporation, New York, has started construction of a copper rolling and wire mill at 3600 Mines Avenue, to cost $55,000. Company has contract for 1,625 miles of transmission cable for the Boulder Dam project.

Fluor Corporation, 851 East 60th Street, making batteries, has tripled its production. **P. E. Fluor** is general manager.

J. T. Roffy, 6343-a Seville Avenue, Huntington Park, is considering starting a factory to manufacture metal products of his own invention.

C. A. Willams, formerly mechanical foreman for American Smelting and Refining Company, Salt Lake City, and now at 216 Incas Avenue, Los Angeles, plans to manufacture a mechanical massager of his own invention.

F. E. Lee and **Harry Finer,** 1438 N. Beechwood Drive, will manufacture a new gold concentrating machine which is used without water. It was invented by **H. L. Adams,** and has been tried out in California and Nevada.

Other Western Notes

Willam J. and **George O. Besler** of Davenport, Iowa, have made four successful flights in their new steam powered metal airplane, making 100 m.p.h. at Oakland, Calif. They plan to manufacture the plane.

The Boeing Airplane factory at Seattle, Wash., is making a new bomber with 2,000 bomb capacity, powered with twin Hornet engines.

P. A. Hoyt of Los Angeles is now secretary of Oliver-United Filters, Oakland, Calif., makers of industrial filtering equipment.

Arizona copper interests are promoting the use of copper for automobile tops, which they state can be provided in very thin, wide sheets which are very durable. H. S.

Pacific States

Los Angeles, Calif.

November 1, 1933.

W. B. Kinner has organized **Security National Aircraft Corporation,** to build planes to sell for less than $2,000. Factory will be at Downey, Calif. Mr. Kinner also heads **Kinner Airplane and Motor Corporation,** plane and motor building concern.

Electrical Research Corporation here will make aeronautical electrical devices.

Continental Can Corporation which has a number of plants on the Coast has re-hired hundreds of employees, and is paying higher wages.

Industrial X-Ray Corporation, 3201 W. Mission Road, Alhambra, Calif., has been formed with $250,000 capital to manufacture industrial X-Ray equipment. **Andrew Lucas** is president; **Dr. G. Kloos,** production manager; **Dr. John R. Vant Groenemout,** engineering manager.

Anaconda Wire and Cable Company at Orange, Calif., will enlarge its plant there, and will add a line of patented hollow conductors to its products. **H. Donn Keresey** is president.

F. C. LaMar, president of **Great Western Fuse Company,** New York, was here recently. His company does a large business with the motion picture studios. He said his company's business had increased 300% since last January.

United Air Lines, Glendale, Calif., is installing automatic pilots, so-called

Metal Market Review

November 1, 1933.

Copper—After holding steadily at 9c. delivered Connecticut since early in July, the price of copper began to drop on October 9, when it went off ¼c. Further declines brought it to 7½c. on October 18. Then the price started upward again, and reached 8¼c. by the end of the month.

Business was spasmodic last month. After the decline set in there was some buying, including metal for 1934 delivery.

The copper industry is still working out its code under the N. R. A. Toward the end of the month it was not yet complete, but observers felt that progress was being made toward an arrangement which would be satisfactory to the industry and also the government.

The Philadelphia Metals Association, representing secondary metal dealers, at a meeting October 19 sent a telegram to General Hugh Johnson, head of the N.R.A., asking him to investigate the decline in the price of copper that occurred last month. They pointed out it was "unwarranted," and tended to "defeat the purposes of the N.R.A."

Lead—The price held at 4.35c. St. Louis until October 16, when it went off ten points, and thereafter by degrees it dropped until it was 3.90c. the 19th. On October 25 it started upward again, closing the month at 4.15c.

Stocks of refined lead were larger at the end of September, according to the trade statistics. Shipments were smaller in September than in August.

Zinc—The price held up surprisingly well, despite unsettled markets for the other nonferrous metals. Zinc held steadily throughout the month at 4.75c. St. Louis for prime western.

The statistics for September showed that for the first time since March, 1930, stocks of slab zinc held by producers were under 100,000 tons; the total was 98,219 tons October 1. However, shipments in September were lower than the preceding month. Production was steady. Unfilled orders October 1 were 27,763 tons, a gain of over 2,200 tons on the month.

Tin—Fluctuations were all the way from 46c. to 49c. last month, though not in that order. Early in the month the price touched the higher figure for a day or so, then declined steadily (with a few upward spurts for a day at a time, however) and touched 46c. October 20. It climbed again, however, and toward the month-end was again well above 48c.

Exports of tin from Britain to this country have gained remarkably this year. The explanation is believed to be larger purchases from U. K. and smaller ones from Malaya.

Aluminum prices were unchanged. On September 29 last the hearings on a code for the aluminum industry stopped abruptly due to sharp differences be-

tween various elements in the industry. A committee of four was appointed to iron out the differences. It was made up of A. K. Davis, board chairman of the Aluminum Company of America; L. D. Stapleton, president, Fairmont Aluminum Company; George Carter and William Hastings, representatives of the independent manufacturers. A resolution was drawn up by three independents, Aluminum Products Corp., Bausch and Sheet Aluminum Corp., and presented to the N.R.A., asking it to incorporate in any code that resulted a provision that "so long as production of virgin aluminum in the United States is controlled directly or indirectly by a single person, that person shall not sell such aluminum for a price greater than the sum of its cost plus a reasonable profit" or some similar provision to the same effect. (The price of aluminum has remained unchanged for some years.—Ed.)

Antimony held at 7c. for part of the month, then weakened and declined gradually to 6.70c.

Silver began the month at 40c/., but declined to lower levels, touching 36.-12½c. the 16th. By the end of the month it was back to 38½c.

Gold—The new gold buying policy of the government has been so widely publicized in the newspapers that comment here would be superfluous. It affects the gold purchased for use in the arts, of course, as well as coinage and bullion metal.

Platinum remained unchanged at $36 last month. The Bureau of Mines reports that refiners in this country last year sold 83,433 troy ounces of platinum metals, as against 119,197 troy ounces in 1931. Jewelry took 50% in 1932, against 39% in 1931. The balance was divided between the chemical, electrical, dental and other industries.

Scrap Metals—The scrap markets followed the virgin metals generally. Prices are shown on the opposite page. Brass ingot makers appear to be none too optimistic as deliveries have shrunk lately. Remelt aluminum has been dull and weak in price.

Brass Ingot Statistics

On October 1, unfilled orders from brass and bronze ingots and billets on the books of the members of the Non-Ferrous Ingot Metal Institute, Chicago, Ill., amounted to a total of 14,065 net tons, as compared with 14,664 tons September 1.

The combined deliveries of brass and bronze ingots and billets by the members of the Institute for September amounted to 4,386 tons, as compared with 5,027 tons delivered in August.

Average prices per pound received by the Institute members on commercial grades of six principal mixtures of ingot brass during the twenty-eight day period ending October 6, 1933, are as follows, with comparative prices reported for the period ended September 8:

Grade and % Impurities	28 Days Ended Oct. 6	Sept. 8
Commercial 80-10-10	10.028c	10.217c
Commercial 78%	8.250c	8.671c
Commercial 81%	8.482c	8.500c
Commercial 83%	8.752c	8.753c
Commercial 85-5-5-5	9.005c	9.014c
Com. No. 1 yellow	7.268c	7.251c

The Wrought Metal Market

November 1, 1933.

The brass products remained steady in price last month, despite the break in the virgin copper prices. Most of the other semi-fabricated products were steady in price, except aluminum sheet and coil, which were advanced to 32.80c. per pound for 18 gauge sheet and 30.50c. for 24 gauge coils, these being base quotations on ton lots.

The automobile industry has slackened activity somewhat, as is usual at this time of the year. New models are being prepared, and after the 1934 shows in various parts of the country, at which buying interest will be measured, things may start to hum again on new lines as well as accessories. This is purely speculative at this time, however, as the whims of the consuming public are difficult to predict in times like these.

Less is heard of the brewing and bar fixture trade now. However, fair amounts of sheet, tubing and other forms of copper, brass, in, monel and other metals and alloys are still going into these lines.

Twelve Monel shafts of 6 inch diameter, 18 feet long, have been supplied for sluice gate stems for Madden Dam, Canal Zone. The shafts were cold worked from heavy bars. They have unusual physical properties, such as 101,000 pounls breaking strength; 76,-000 pounds per square inch yield point; modulus of elasticity of 26,000,000.

Daily Metal Prices for October, 1933

Record of Daily, Highest, Lowest and Average Prices and the Customs Duties

	2	3	4	5	6	9	10	11	12*	13	16	17	18
Copper c/lb. Duty 4c/lb.													
Lake (Producers' Prices, Del. Conn.)	9.125	9.125	9.125	9.125	9.125	8.875	8.625	8.125	....	8.125	8.125	7.875	7.625
Electrolytic (Producers' Prices, Del. Conn.)	9.00	9.00	9.00	9.00	9.00	8.75	8.50	8.00	....	8.00	8.00	7.75	7.50
Casting (f.o.b. ref.)	8.75	8.75	8.75	8.75	8.75	8.50	8.25	7.75	....	7.75	7.75	7.50	7.25
Zinc (f.o.b. East St. L.) c/lb. Duty 1¾c/lb.													
Prime Western (for Brass Special add 0.05)	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	....	4.75	4.75	4.75	4.75
Tin (f.o.b. N.Y.) c/lb. Duty Free													
Straits	48.875	48.40	48.75	49.00	48.875	48.25	48.375	47.875	...	47.00	46.50	47.00	46.625
Lead (f.o.b. St. L.) c/lb. Duty 2½c/lb.	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35	....	4.35	4.25	4.10	4.00
Aluminum c/lb. Duty 4c/lb.	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	....	23.30	23.30	23.30	23.30
Nickel c/lb. Duty 3c/lb.													
Electrolytic 99.9% (for shot, add 1.00c., for pellets add 5.00c.)	35	35	35	35	35	35	35	35	....	35	35	35	35
Antimony (Ch. 99%) c/lb. Duty 2c/lb.	7.00	7.00	7.00	7.00	7.00	7.00	7.00	6.875	....	6.875	6.875	6.75	6.75
Silver c/oz. Troy Duty Free	40.00	39.75	39.875	39.625	39.625	38.75	38.625	38.00	....	37.50	36.125	36.25	36.75
Platinum $/oz. Troy Duty Free	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	....	36.00	36.00	36.00	36.00
Gold—R. F. C. Official Price—$/on Troy†	31.88	32.12	31.79	31.55	31.72	31.14	31.26	30.91	....	30.62	29.00	29.86	30.33

	19	20	23	24	25	26	27	30	31	High	Low	Aver.
Copper c/lb. Duty 4c/lb.												
Lake (Producers' Prices, Del. Conn.)	7.625	7.625	7.75	8.125	8.375	8.375	8.375	8.375	8.375	9.125	7.625	8.381
Electrolytic (Producers' Prices, Del. Conn.)	7.50	7.50	7.625	8.00	8.25	8.25	8.25	8.25	8.25	9.00	7.50	8.256
Casting (f.o.b ref.)	7.25	7.25	7.375	7.75	8.00	8.00	8.00	8.00	8.00	8.75	7.25	8.006
Zinc (f.o.b. East St. L.) c/lb. Duty 1¾c/lb.												
Prime Western (for Brass Special add 0.05)	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75
Tin (f.o.b. N.Y.) c/lb. Duty Free												
Straits	46.20	46.00	47.10	48.25	48.75	48.625	48.375	48.70	48.80	49.00	46.00	47.920
Lead (f.o.b. St. L.) c/lb. Duty 2½c/lb	3.90	3.90	3.90	3.90	4.05	4.15	4.15	4.15	4.15	4.35	3.90	4.179
Aluminum c/lb. Duty 4c/lb.	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30
Nickel c/lb. Duty 3c/lb.												
Electrolytic 99.9% (for shot, add 1.00c., for pellets add 5.00c.)	35	35	35	35	35	35	35	35	35	35	35	35
Antimony (Ch. 99%) c/lb. Duty 2c/lb.	6.75	6.75	6.75	6.70	6.70	6.70	6.70	6.70	6.70	7.00	6.70	6.837
Silver c/oz. Troy Duty Free	36.25	36.625	37.625	37.50	38.625	38.625	38.50	39.625	39.375	40.00	36.125	38.268
Platinum $/oz. Troy Duty Free	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
Gold—R. F. C. Official Price—$/on Troy†	29.18	29.13	29.59	29.80	31.36	31.54	31.76	31.96	32.12	32.12	29.00	....

* Holiday. † Price set for newly mined gold by Reconstruction Finance Corporation.

Metal Prices, November 1, 1933

(Import duties and taxes under U. S. Tariff Act of 1930, and Revenue Act of 1932)

NEW METALS

Copper: Lake, 8.125, Electrolytic, 8.125, Casting, 7.75.
Zinc: Prime Western, 4.75. Brass Special, 4.80.
Tin: Straits, 49.00. Pig, 99%, 47.50.
Lead: 4.15. Aluminum, 23.30. Antimony, 6.70.
Nickel: Ingot, 35. Shot, 36. Elec., 35. Pellets, 40.
Quicksilver: Flask, 75 lbs., $67. Bismuth, $1.20.
Cadmium, 55. **Silver**, Troy oz., official price, N. Y., November 3, 40.50. **Gold:** oz., Troy, Official U. S. Treasury price November 1, $32.26.
Platinum, oz. Troy, $36.00.

Duties: Copper, 4c. lb.; zinc, 1¼c. lb.; tin, free; lead, 2½c. lb.; aluminum, 4c. lb.; antimony, 2c. lb.; nickel, 3c. lb.; quicksilver, 25c. lb.; bismuth, 7½%; cadmium, 15c. lb.; cobalt, free; silver, free; gold, free; platinum, free.

INGOT METALS AND ALLOYS

	Cents lb.	U. S. Import Duty	U. S. Import Tax*
Brass Ingots, Yellow	6½ to 8	None	4c. lb.[1]
Brass Ingots, Red	8 to10	do	do
Bronze Ingots	8¾to10	do	do
Aluminum Casting Alloys	13 to22	4c. lb.	None
Manganese Bronze Castings	20 to34	45% a. v.	3c. lb.[2]
Manganese Bronze Forgings	26 to38	do	do
Manganese Bronze Ingots	8½to12	do	4c. lb.[1]
Manganese Copper, 30%	11½to16	25% a. v.	3c. lb.[2]
Monel Metal Shot or Block	28	do	None
Phosphor Bronze Ingots	8½to12	None	4c. lb.[1]
Phosphor Copper, guaranteed 15%	13¼to17	3c. lb.[2]	do
Phosphor Copper, guaranteed 10%	12¼to16	do	do
Phosphor Tin, no guarantee	52½to75	None	None
Silicon Copper, 10%	18 to30	45% a. v.	4c. lb.[1]
Iridium Platinum, 5%	$37.25-38.75	None	None
Iridium Platinum, 10%	$38.50-40.00	None	None

*Duty is under U. S. Tariff Act of 1930; tax under Section 60 (7) of Revenue Act of 1932.
[1]On copper content. [2]On total weight. "a. v." means ad valorem.

OLD METALS

Dealers' buying prices, wholesale quantities:	Cents lb.	Duty	U. S. Import Tax
Heavy copper and wire, mixed	5¾to 6¼	Free	4c. per pound on copper content.
Light copper	5¼to 5½	Free	
Heavy yellow brass	3⅜to 3⅝	Free	
Light brass	3 to 3¼	Free	
No. 1 composition	4¼to 5	Free	
Composition turnings	4¼to 4½	Free	
Heavy soft lead	3⅛to 3⅜	2⅛c. lb.	
Old zinc	2¾to 3	1½c. lb.	
New zinc clips	3½to 3¾	1½c. lb.	
Aluminum clips (new, soft)	14 to14½	4c. lb.	
Scrap aluminum, cast, mixed	7¼to 9½	4c. lb.	
Aluminum borings—turnings	4½to 5	4c. lb.	None.
No. 1 pewter	29 to31	Free	
Electrotype or stereotype	3⅛to 3⅜	2⅛c. lb.*	
Nickel anodes	27 to29	10%	
Nickel clips, new	29 to31	10%	
Monel scrap	10 to15	10% a. v.	

*On lead content.

Wrought Metals and Alloys

The following are net BASE PRICES per pound, to which must be added extras for size, shape, small quantity, packing, etc., as shown in manufacturers' price lists, effective since August 4, 1933.

COPPER MATERIAL

	Net base per lb.	Duty*
Sheet, hot rolled	17.12½	2½c. lb.
Bare wire, soft, less than carloads	12.25	25% a. v.
Seamless tubing	16.62½	7c. lb.

*Each of the above subject to import tax of 4c. lb. in addition to duty, under Revenue Act of 1932.

NICKEL SILVER

Net base prices per lb. (Duty 30% ad valorem.)

Grade "A" Sheet Metal		Wire and Rod	
10% Quality	23.37½c.	10% Quality	26.25 c.
15% Quality	25.50 c.	15% Quality	30.62½c.
18% Quality	26.75 c.	18% Quality	33.87½c.

ALUMINUM SHEET AND COIL

(Duty 7c. per lb.)

Aluminum sheet, 18 ga., base, ton lots, per lb. 32.80
Aluminum coils, 24 ga., base price, tons lots, per lb.....30.50

ROLLED NICKEL SHEET AND ROD

(Duty 25% ad valorem, plus 10% if cold worked.)

Net Base Prices

Cold Drawn Rods	50c.	Cold Rolled Sheet	60c.
Hot Rolled Rods	45c.	Full Finished Sheet	52c.

MONEL METAL SHEET AND ROD

(Duty 25% ad valorem, plus 10% if cold worked.)

Hot Rolled Rods (base)	35	Full Finished Sheets (base)	42
Cold Drawn Rods (base)	40	Cold Rolled Sheets (base)	50

SILVER SHEET

Rolled sterling silver (November 3) 43.50c. per Troy oz. upward according to quantity. (Duty, 65% ad valorem.)

BRASS AND BRONZE MATERIAL

Net base prices per pound, mill shipments.

	High Brass	Low Brass	Bronze	Duty	
Sheet	14.75c.	16.00c.	16.37½	4c. lb.	U. S. Import Tax 4c. lb on copper content No tax.
Wire	14.75c.	16.00c.	16.37½	25%	
Rod	12.25c.	15.75c.	16.12½	4c. lb.	
Angles, channels	22.75c.		24.37½c.	12c. lb.	
Seamless tubing	16.37½c.		18.12½c.	8c. lb.	
Open seam tubing	22.75c.		24.37½c.	20%a.v.	

TOBIN BRONZE AND MUNTZ METAL

(Duty 4c. lb.; import tax 4c. lb. on copper content.)

Net base prices per pound.	
Tobin Bronze Rod	16.00c.
Muntz or Yellow Rectangular and other sheathing	16.87½c.
Muntz or Yellow Metal Rod	13.25c.

ZINC AND LEAD SHEET

	Cents per lb. Net Base	Duty
Zinc sheet, carload lots, standard sizes and gauges, at mill, less 7 per cent discount	9.50	2c. lb.
Zinc sheet, full casks (jobbers' price)	9.75	2c. lb.
Zinc sheet, open casks (jobbers' price)	10.50to10.75	2c. lb.
Full Lead Sheet (base price)	7.75	2⅜c. lb.
Cut Lead Sheet (base price)	8.00	2⅜c. lb.

BLOCK TIN, PEWTER AND BRITANNIA SHEET

(Duty free)

This list applies to either block tin or No. 1 Britannia Metal Sheet, No. 23 B. & S. Gauge, 18 inches wide or less; prices are all f. o. b. mill:

500 lbs. or over .....15c. above N. Y. pig tin price
100 to 500 lbs. .....17c. above N. Y. pig tin price
Up to 100 lbs. .....25c. above N. Y. pig tin price

Lighter gauges command "extras" over the above prices.

Supply Prices, November 1, 1933

ANODES

Prices, except silver, are per lb f.o.b., shipping point based on purchases 500 lbs. or more, and are subject to changes due to fluctuating metal markets.

Copper: Cast ..... 17¼c. per lb.
Electrolytic, full size, 13¼c.; cut to size, 13½c. per lb.
Rolled oval, straight, 15¼c.; curved, 16¼c. per lb.

Brass: Cast ..... 16¼c. per lb.

Zinc: Cast ..... 9c. per lb.

Nickel: 90-92% ..... 43c. per lb.
95-97% ..... 44c. per lb.
99%+ cast, 46c.; rolled, depolarized, 47c.

Silver: Rolled silver anodes .999 fine were quoted Nov. 3, from 43.50c., per Troy ounce upward, depending upon quantity.

WHITE SPANISH FELT POLISHING WHEELS

Diameter	Thickness	Under 50 lbs.	50 to 100 lbs.	Over 100 lbs.
10-12-14 & 16	1" to 2"	$2.95/lb.	$2.65/lb.	$2.45/lb.
10-12-14 & 16	2 to 3½	2.85	2.55	2.35
6-8 & over 16	1 to 2	3.05	2.75	2.55
6-8 & over 16	2 to 3½	3.00	2.70	2.45
6 to 24	Under ½	4.25	3.95	3.75
6 to 24	½ to 1	3.95	3.65	3.45
6 to 24	Over 3½	3.35	3.05	2.85

Any Quantity

4 to 6	Under ½, $5.00	½-1,	$4.85	1 to 3,	$4.75
1½ to 4	" 5.55	"	5.40	"	5.35
1 to ½	" 5.85	"	5.70	"	5.60

Extras: 25c per lb. on wheels, 1 to 6 in. diam., over 3 in. thick.
On grey Mexican wheels deduct 10c. per lb. from above prices.

COTTON BUFFS

Full disc open buffs, per 100 sections when purchased in lots of 100 or less were quoted July 31:

14" 20 ply 84/92 Unbleached	$63.41-78.53
11" 20 ply 84/92 Unbleached	43.28-53.60
14" 20 ply 80/92 Unbleached	47.69-59.06
11" 20 ply 80/92 Unbleached	32.68-40.47
14" 20 ply 64/68 Unbleached	45.94-56.89
11" 20 ply 64/68 Unbleached	31.49-39.00
Sewed Pieced Buffs, per lb., bleached	40c. to 1.09

CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone	lb.	.09-.10½
Acid—Boric (Boracic) granular, 99½+% ton lots	lb.	.04½-.05
Chromic, 75 to 400 lb. drums	lb.	.14-.14¼
Hydrochloric (Muriatic) Tech., 20 deg., carboys	lb.	.02
Hydrochloric, C. P., 20 deg., carboys	lb.	.06
Hydrofluoric, 30%, bbls.	lb.	.08-.12
Nitric, 36 deg., carboys	lb.	.06-.06½
Nitric, 42 deg., carboys	lb.	.07-.08
Sulphuric, 66 deg., carboys	lb.	.02
Alcohol—Butyl	lb.	.095-.11
Denatured drums	gal.	.475-.476
Alum—Lump, barrels	lb.	.03¼-.04
Powdered, barrels	lb.	.03½-.05
Ammonia, aqua, com'l., 26 deg., drums, carboys	lb.	.02¾-.05
Ammonium—Sulphate, tech., bbls.	lb.	.03½-.05
Sulphocyanide, technical crystals	lb.	.42
Arsenic, white, kegs	lb.	.04½-.05
Asphaltum	lb.	.35
Benzol, pure	gal.	.58
Borax, granular, 99½+%, ton lots	lb.	.02¼-.02¾
Cadmium oxide, 50 to 1,000 lbs.	lb.	.55
Calcium Carbonate (Precipitated Chalk)	lb.	.05¾-.07½
Carbon Bisulphide, drums	lb.	.06-.12
Chrome Green, bbls.	lb.	.18¾
Chromic Sulphate	lb.	.33-.55
Copper—Acetate (Verdigris)	lb.	.23
Carbonate, bbls.	lb.	.15-.18
Cyanide (100 lb. kgs.)	lb.	.39
Sulphate, bbls.	lb.	4.45
Cream of Tartar Crystals (Potassium Bitartrate)	lb.	.20¼-.20½
Crocus	lb.	.15
Dextrin	lb.	.05-.08
Emery Flour	lb.	.06
Flint, powdered	ton	$30.00
Fluorspar, bags	lb.	.03½
Gold Chloride	Price subject to gold price fluctuations.	
Gum—Sandarac	lb.	.26
Shellac	lb.	.32-.34
Iron Sulphate (Copperas), bbls.	lb.	.01½
Lacquer Solvents	gal.	85
Lead—Acetate (Sugar of Lead)	lb.	.10-13¼
Yellow Oxide (Litharge)	lb.	.12½
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.58
Methanol, 100% synth., drums	gal.	.41½
Nickel—Carbonate, dry, bbls.	lb.	.35-.41
Chloride, bbls.	lb.	.17-.21
Salts, single, 300 and 425 lb. bbls.	lb.	.12-.13
Salts, double, 425 lb. bbls.	lb.	.12-.13
Paraffin	lb.	.05-.06
Phosphorus—Duty free, according to quantity	lb.	.35-.40
Potash Caustic Electrolytic 88-92% broken, drums	lb.	.08-.093
Potassium—Bichromate, casks (crystals)	lb.	.08
Carbonate, 96-98%	lb.	.08¾
Cyanide, 165 lbs. cases, 94-96%	lb.	.57½
Pumice, ground, bbls.	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls.	lb.	.04½
Rouge—Nickel, 100 lb. lots	lb.	.25
Silver and Gold	lb.	.65
Sal Ammoniac (Ammonium Chloride) in bbls.	lb.	.05-.05½
Silver—Chloride, dry, 100 oz. lots / Cyanide / Nitrate 100 ounce lots	Prices subject to rapid fluctuations of silver market.	
Soda Ash, 58%, bbls.	lb.	.024
Sodium—Cyanide, 96 to 98%, 100 lbs.	lb.	.16½-.22
Beryllium fluoride ($2NaF.BeF_2$)	lb.	4.30-7.00
Hyposulphite, kegs, bbls.	lb.	.03½-.06½
Metasilicate, granular, bbls.	lb.	3.55-3.70
Nitrate, tech., bbls.	lb.	.03¼-.07
Phosphate, tech., bbls.	lb.	.03¾
Silicate (Water Glass), bbls.	lb.	.01½
Stannate, fluctuating	lb.	.35
Sulphocyanide	lb.	.30-.45
Sulphur (Brimstone), bbls.	lb.	.02
Tin Chloride, fluctuating, 100 lb. kegs	lb.	.37½
Tripoli, powdered	lb.	.03
Wax—Bees, white, ref. bleached	lb.	.60
Yellow, No. 1	lb.	.45
Whiting, Bolted	lb.	.02½-.06
Zinc—Carbonate, bbls.	lb.	.11
Chloride, drums, bbls.	lb.	.07½-.10
Cyanide (100 lb. kegs)	lb.	.38
Sulphate, bbls.	lb.	.03½

METAL INDUSTRY

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Christmas Greetings!

AS another year draws to a close, we extend to you our best wishes for the Christmas season and for the New Year.

We are appreciative of your friendship and of the patronage you have given us. We pledge our best efforts to make MATCHLESS COMPOSITIONS and MATCHLESS SERVICE of even greater value to you.

As the New Year advances may it bring you an increasing measure of prosperity and happiness.

The

Matchless Metal Polish Co.

840 W. 49th Pl. Chicago, Ill.

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726 Bloomfield Ave. Glen Ridge, N. J.

pure

manganese 96-98%

and

manganese alloys

(Including 30% manganese copper, manganese titanium, manganese aluminum, and manganese boron)

of various compositions, carbon free and technically free from iron and other impurities, in convenient size, used in the production of:

Brass and bronze	Nickel
Nickel silver	Aluminum
Monel metal	Composition

Write for Metals Booklet No. 2058, which describes the uses of our carbon-free metals and alloys

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